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HOLMES' NEW BARREL MACHINERY.

Several months ago we laid before our readers a detailed description of the operations involved in barrel-making by means of a variety of entirely novel machinery. The article referred to will be found on page 191, Vol. XXX., and we took occasion therein to trace the course of the staves, beginning with their preparation in the jointing machine, thence to their being set up in barrel shape, the bending by heat, the leveling of the cask so that it would stand perpendicularly on end, the trussing, and, lastly, the chamfering, howeling, and crozing. We left the barrels entirely complete, with the exception of the heads, the machines for the manufacture of which we failed to describe for the very excellent reason that they were still in the hands of the inventors. We are now, however, enabled to make good the deficiency; and in the following description and accompanying engravings, the reader will learn of the three ingenious devices which produce the above mentioned essential portions of the barrel, and, besides, of a novel machine which combines the powers of both trusser and leveler, and of still another apparatus that bends, punches, and rivets metal hoops.

Every one knows that barrel heads are not usually made of a single piece, and that for ordinary casks they are generally of several portions jointed and doweled together. To make the joints and to prepare the pieces of heading, which have been previously sawn to the proper length, for the dowels, is the object of the machine exhibited in Fig. 1. This consists in a large rotating metal disk, in the face of which are fixed three cutters, equidistant from each other. In front of the disk is a standard and rest. Upon the latter the piece of rough heading is laid, and its edges are pressed against the disk by hand, so that they are thus rendered perfectly smooth and straight. The work is then removed and laid upon another rest on top of the machine, where it encounters two swiftly revolving augers or bits, which are forced against the edge by the foot treadle shown, and which speedily bore the holes for the dowels. There are no shavings visible about this machine, since the disk acts as a fan and blows them away through the shoot shown at the right hand of the engraving. The heads of a large number of barrels can thus be prepared per day by a single man, and the joint knives are so arranged that either a hollow or straight joint can be made, as desired.

The dowels are next inserted by hand, and the separate pieces put together, forming rough squares, ready for the next process. This consists in leveling, facing, and dressing the material on one side, and it is accomplished by the machine represented in Fig. 2. A prepared head is laid upon the table and in front of a planer cylinder, on which are several blades, and which is swiftly rotated by the driving pulley shown on the left. The pulleys on rhe right actuate four corrugated feed rolls which are held firmly against the work by weighted levers acting upon the bearings. The revolution of the feed rolls carries the head over the planer knives, which rapidly smooth off the under side at the rate of from fifteen to twenty-five heads a minute. The machine will also dress piece heading, taking off just sufficient material to produce the requisite finish.

The next operation is turning the heads in circular form and, at the same time, beveling the edge with two bevels, the upper bevel being less than the lower one. The machine employed is represented in Fig. 3, and is a remarkably ingenious contrivance. The head is placed between two disks, one of which, that on the right in the illustration, is provided with a number of spring pins near its periphery, which press the work against the opposite disk. The pin disk is not connected with the driving machinery. Its spindle enters the cylindrical standard on the right, in which is placed apparatus by means of which the disk is thrown forward and locked in that position, firmly holding the work. Through the rotation of the opposite disk, the pin disk is also carried around, but for only one revolution, at the end of which stop mechanism, in rear of the standard and not shown in the engraving, is actuated to unlock the clamp, so that the pin disk springs back and allows the work to fall out. In case it be desired to accomplish this unlocking before a revolution is completed, the handle (shown protruding from the center of the top of the standard) serves to actuate the mechanism necessary therefor. Before the unfinished head is put into the machine to be rounded, its center is found and marked by an apparatus for that purpose.

When the head is put into the machine, the centering pin, which is jointed to the hand lever beside the standard, is pushed forward by the use of the lever, and is brought in contact with the center mark on the head, thus centering it perfectly and saving all the material. The centering apparatus can be used or not, as desired. The disk on the left is rotated by mechanism by the driving pulley, which is thrown into or out of gear by the horizontal handle shown.

[*For remainder, see page 86.*]

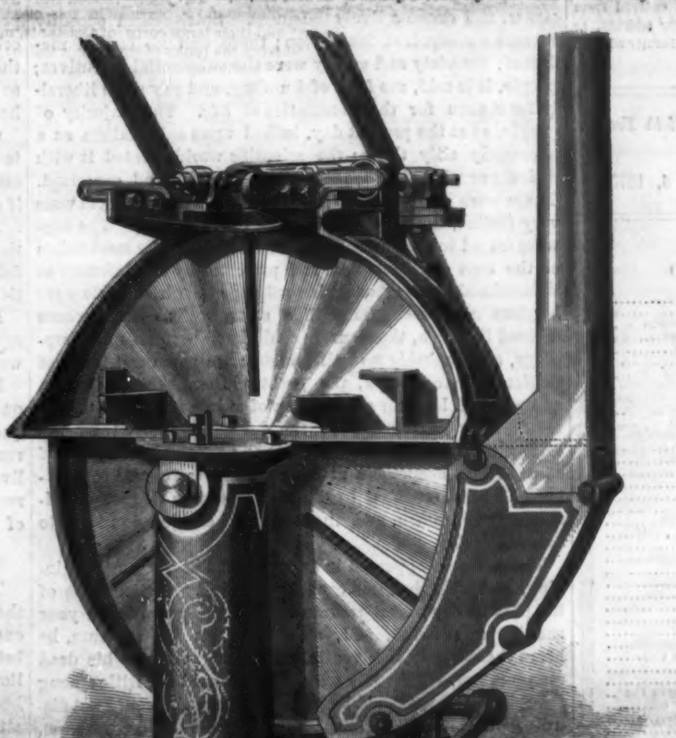

Fig. 1.—BARREL HEAD JOINTING AND BORING MACHINE.

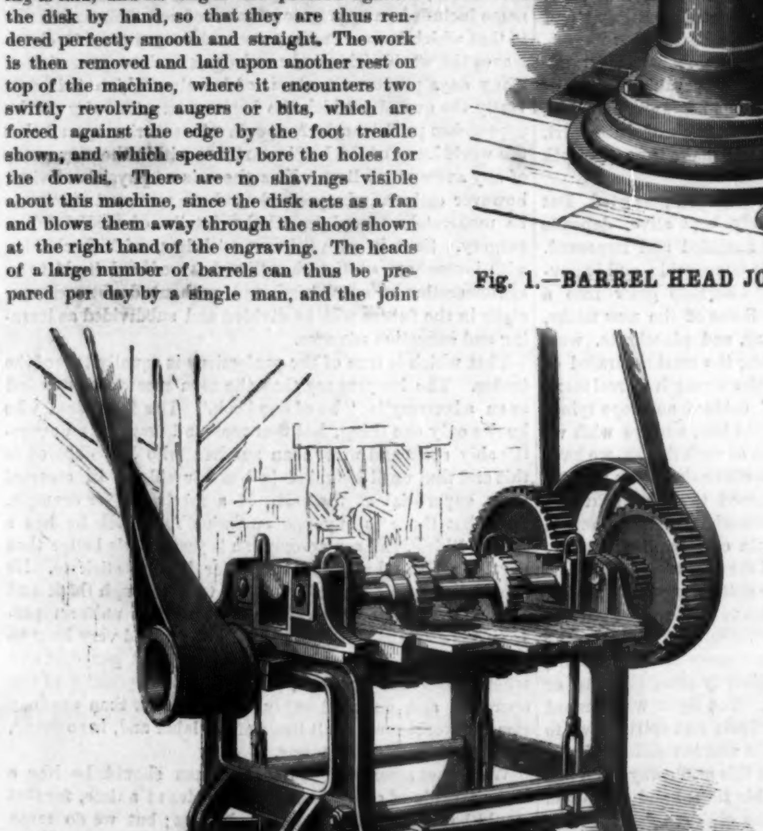

Fig. 2.—MACHINE FOR DRESSING BARREL HEAD S'

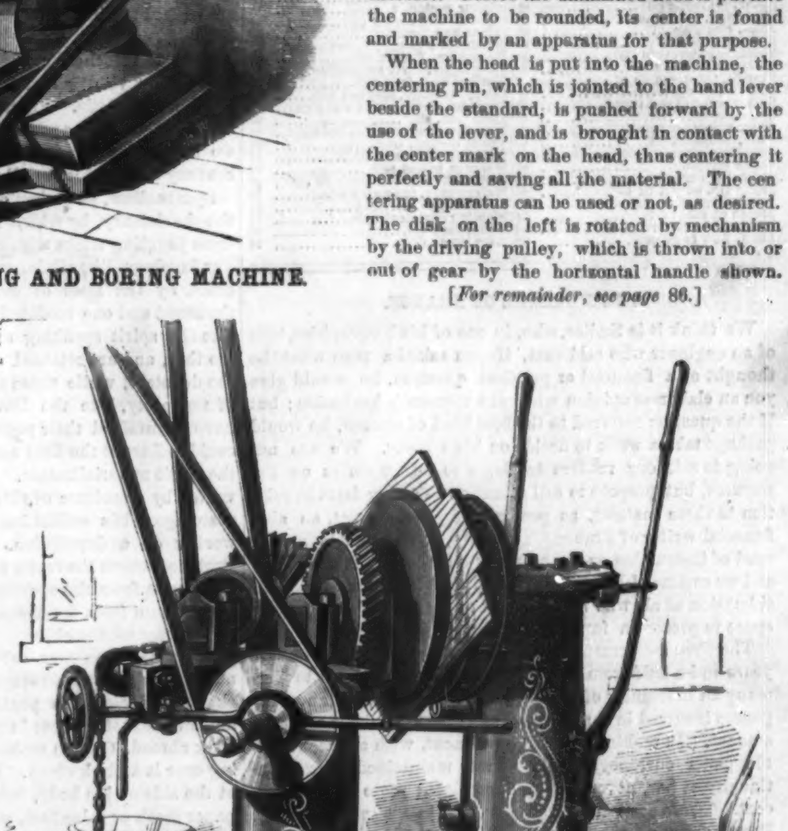

Fig. 3.—MACHINE FOR TURNING HEADS OF DIFFERENT SIZES

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VOLUME XXXII., No 6. [NEW SERIES.] *Thirtieth Year.*

NEW YORK, SATURDAY, FEBRUARY 6, 1875.

Contents.

(Illustrated articles are marked with an asterisk.)

THE EXAMPLE OF FRANCE.

We think it is Smiles, who, in one of his biographies, tells of an engineer who said that, if you asked a man what he thought of a financial or political question, he would give you an elaborate opinion without a moment's hesitation; but if the question referred to the best kind of cement, he would perhaps take a week to decide on his answer. We are not going to ask our readers to listen to our theories on the finances, but propose to call attention to a few facts in relation to these matters, as presented by Mr. Bennet, an able financial writer of France. Certainly, if any people are in need of instruction on the currency question, it is ourselves, and we commend Mr. Bennet's pamphlet to the attentive consideration of all who feel inclined to learn. We have only space to present a few of its salient points.

The Franco-German war ended in May, 1871; and in two years and a half from that time, the French had paid to Germany an indemnity of $1,000,000,000 in specie, their own expenses incurred in the war having reached to about an equal amount. In making this large payment, with an inconvertible paper currency, the latter was maintained almost continually at par, never having depreciated more than 2½ per cent. These are interesting facts, and in his pamphlet Mr. Bennet gives us the reasons. It is first to be noticed that, for nearly the whole period since the war, France has been the creditor of other nations, and it was on the occasion of the exchange turning the other way that the paper currency was depreciated. It is estimated that the amount of specie in France is largely in excess of the legal tender circulation, and the Bank of France has a specie reserve of 52 per cent of its outstanding circulation. In other words, the paper money of France is strengthened by specie, which, though not in circulation, is still in the country, and can be utilized if occasion arises. Mr. Bennet, while contending that bank bills not fully protected by specie reserve are a source of great danger, shows their great convenience and, in his view, absolute necessity, in these times, if their issue is under proper restrictions. What constitutes money, the origin of banks, and matters of this nature are treated by M. Bennet in a clear and thorough manner, and we hope that his pamphlet will be widely circulated. Our own finances have not been managed in so wise a manner, and the condition of affairs in the country is not so prosperous at present, that we can afford to disregard the "Example of France," which country, incurring a war debt nearly two thirds as large as our own, in the short space of ten months is apparently on the direct road to a sound financial system, without having experienced a serious monetary crisis.

THE "SCIENCE" OF SPIRITUALISM.

On page 359 of the last volume of the SCIENTIFIC AMERICAN, we presented some of the teachings of science regarding spiritualism; today we further elucidate the subject by brief allusions to some of the facts in the history of this latest epidemic of superstition.

It broke out about twenty-five years ago, and the manifestations were popularly known as Rochester knockings or spirit rappings. The first mediums were three sisters; their name was Fox. They invented the raps, the rap language, and a good part of the spiritual lingo. They originated the *séance*, and drove a lively business. Spiritualism speedily became a recognized institution; there was no lack of mediums; notoriety and money were the substantial incentives; people, it is said, are fond of humbug, and pay more liberally for it than for the necessaries of life. The majority of people, as at the present day, looked upon spiritualism as a supremely silly thing; the scientific world treated it with ridicule or with a silence inspired by disgust and contempt. There were investigations; and although many of them were very foolish, the rapping trick was fairly exposed The raps were traced to the persons of the Fox girls The mechanism of the raps was concealed and protected by the defences of womanhood; to the modest investigator the girls' skirts were barriers more formidable than stone walls. Had women dressed like men, there surely could have been no spirit rappings, and probably no spiritualism; we commend the fact to Herr Teufelsdroeck, the great philosopher of clothes, and we shall look for a discussion of it in a future edition of his "Sartor Resartus." Of the devices employed by the early mediums, the most elaborate and successful was that of a bar of lead suspended at its center by an elastic cord attached to and operated by the leg; of course this was available only to women, and the men were obliged to resort to something else.

The devotees appeared in swarms, and at the very beginning, and with the same capacity of swallowing as those of the present day; let a jackass bray in the presence of your genuine spiritualist, and, at a hint from his medium, he hears therein only the gentle and loving voice of his dead grandmother. The early exposures counted for little among the faithful; a thousand bogus raps, they said, could not disturb their faith in the one that they knew to be genuine. Also the theory was invented at a very early day that there are wicked spirits, which make honest mediums cheat and lie.

Thus the Rochester knockings became modern spiritualism, with a vitality and diffusiveness comparable to those of the Canada thistle. From the ridiculous beginning of what, in its inception, was probably an innocent freak of a little girl, we have today a superstition which will make the nineteenth century memorable for all time.

Spiritualism, as an ism or theory, was soon perfected. But the charlatanry, by which it is mainly kept alive, depends upon juggling tricks which may be modified and improved. For jugglery, like all human arts, is improvable, and is governed by the laws of evolution. The raps grew into a thousand and one modified forms. Some of the new tricks, like the spirit speaking and writing, and planchette, were too thin, and are retained only among the most saturated of the devotees, while those that had the strength of real merit of ingenuity, like the Davenports' cabinet and rope tying, have maintained their popularity. At last, and we wish we could believe it the final culmination of such things, we have the spirit materialization. The materialization trick was invented by a medium of this city, named Gordon, about two years ago. His exhibition was somewhat artistic, and is worthy of a description. A curtain of mosquito netting, stretched across the room, separated the operator and his paraphernalia from the spectators; the netting served to protect the medium from intrusion, and also to give a more ghostly appearance to the objects exhibited. In the middle of the spiritual sanctum was erected a gorgeous altar or throne, about which Gordon, arrayed in a priestly robe, incanted or chasséed during the performance. The light was turned down to that faintness in which ghosts and spirits love to walk abroad. Gordon makes his right arm invisible by drawing over it a black cloak. He raises this arm away from and at the side of his body, holding in his right hand a common paper mask or false face, such as the children get for their amusement at a cost of five or ten cents each. Then he gently moves the mask through the air, or ducks it or bobs it up and down, etc. The performance is repeated with variations, other masks and other motions, for an hour or two. Some of the masks are a little dressed up by means of a white handkerchief thrown over a part or dangling from the lower end; in such simple ways is an old lady with a white cap, or a baby in a long dress, constructed; a bride is got up by placing a gauze veil in front of the mask. Gordon's *répertoire* of masks was extensive; he was able to bring up the spirits of men, women, and babies of all races of mankind.

From the front of the netting, the view, especially to the eyes of the devotee, was impressive. Gordon was a solemn great high priest, or head center; and in response to his incantation, the spirits of the departed, as life-like as if they were flesh and blood, appeared at his side. The materialized spirits were often recognized. It was a common thing to hear, from the crowd of eager spectators, sighs and sobs, and such expressions as "Is that you, Jane?" "Is it my grandmother?" "Is your name Smith?" "It is my darling Bobbie; are you happy?" To all of which, through Gordon's skillful manipulation of the masks, came the appropriate responses.

But Gordon's career as a materializer lasted only a few weeks. One evening, in the midst of the performance, a gentleman of the audience leaped over an intervening table, dodged Gordon's confederate, dashed through the mosquito netting and had Gordon securely in his arms. Gordon was thus caught in the act; he held a mask in his hand, and others were taken from the folds of his robe and other places.

In our next article, we shall give further particulars concerning other forms of "spiritual materializations."

TO OUR FRIENDS.

In dealing with our legions of friends, it is our earnest desire to give satisfaction to every one of them. At this season of the year, when old subscribers are renewing and new names are coming in by the hundred every day, it is impossible to answer all enquiries the very day they are received. But should any suppose that we have overlooked their requests or slighted their interests, we hope they will at all times promptly inform us. Speak plainly, and do not hesitate to complain.

Our mail writers and folders are under special injunctions to write our subscribers' names upon the envelopes legibly, and fold each paper neatly. We shall be glad to be informed if anybody receives slovenly work from this office.

At the beginning of the year, many thousands of subscriptions are renewed, new clubs formed, etc. If any person fails to receive the paper or any premium to which he is entitled, we will thank him to inform us promptly.

If, by any chance, any editor or publisher, who by any agreement is to receive our paper, should fail to receive it, we shall be glad to be informed.

Persons who have written to us upon business or sent enquiries for the paper which have not been answered, are requested to repeat their enquiries. Letters sometimes fail to reach us. Be particular to mention the State in which you live. In some cases we are perplexed to know where to direct, when no State is given and there are many post offices of the same name.

HAVE A SPECIALTY.

The sooner people begin to comprehend that practically there is no business, calling, trade, or profession which any one man can master in all its branches in a lifetime, the better will it be for every individual's prosperity. We believe that half the failures in the great struggle for livelihood are due to men trying to do too much, trying to fulfill all the requirements indicated by a name because their fathers did, but forgetting that, in their fathers' time, that name included an aggregate of labor of very different extent to that which it now encompasses. Every day as it closes leaves the world richer in knowledge, and the aggregation of many days produces a store of learning which increases vastly the quantity which the beginner must master ere he approaches proficiency. A couple of centuries ago all that the world knew of the healing art was within the easy grasp of any average intellect. Now, there is no physician living, however eminent, who pretends to have mastered or even to be moderately versed in all the details of medicine and surgery. So it is with Science, with law, with mechanics, with journalism, until each calling has reduced itself to an agglomeration of specialties; and, without doubt each specialty in the future will be divided and subdivided as learning and education advance.

That which is true of the professions is equally true of the trades. The lawyers say that the man most to be dreaded as an adversary is "he of one book." The individual who knows only one thing, but that root and branch, is unquestionably abler and wiser than another who has dabbled in this and that until his mind is but a jumble of ill assorted ideas, superficial at the best. If a mechanic, for example, finds that there is any one operation for which he has a special liking, and can accomplish it just a little better than anything else, that is the thing for him to stick to. He should make up his mind to cling to it through thick and thin, to try and improve certain parts until a uniform perfection is attained. It does not take the world very long to discover who is the best man for this or that purpose; and when it finds out that man, who has made a specialty of one operation and unquestionably does it better than anybody else, the world must avail itself of his labor and, in so doing, must pay him his own terms.

We do not mean to argue that a man should be like a horse, capable of entertaining but one idea at a time, for that would be to advocate narrowmindedness; but we do mean to say that no man should be without one essential and prevailing object, in the prosecution of which he is determined to excel, and it does not make any difference what that is, whether cleaning a gutter or saving lives. We should liken this uppermost purpose in a man's brain to an elaborate treatise on one subject alone in a library of general encyclopædias. The last indicate the expansion and grasp of one's views on all things, the first their concentration on a life work. The simile is all the more apt, for, after all, when we come to examine everything we know outside our one calling, we find we are only in possession of a more or less copious index. And we are led to the certain conclusion that the very best we can ever hope to do in the attainment of knowledge is to learn where this fact or that theory is to be found most readily when we wish to inform ourselves as to its signification. The wider a man's education the bigger his index; and

perhaps we may safely say that one of the cardinal differences between the educated and uneducated is that the former are capable of instantly selecting the proper means of refreshing their memory, while the latter might spend days in search of the same.

Suppose, for example, that the reader has carefully studied the SCIENTIFIC AMERICAN over a dozen or more volumes. Now if a question occur, the answer to which he has seen in any volume, doubtless he will be able to turn to the proper page, or to its vicinity, and so easily obtain the desired information. But on the other hand, if an individual who had never read the volumes, although knowing, of course, the general nature of their contents, should undertake to find some special information, he would have to pore over the long indices of every volume, and search the pages, wasting perhaps valuable time. In this case the knowledge acquired has a direct pecuniary value, for "time is money"—and this apart from its intrinsic benefit to its possessor.

All this adds weight to our first advice, namely, have a specialty, and push it. Be sure that you are right before you select it. We do not believe that any man can rise to eminence in a calling which he dislikes, and herein lie the oft repeated mistakes of parents in forcing children into trades and professions against the latter's inclinations. A boy who has a feeling for art, who spends every moment with paint and brush, will chafe under coarse mechanical labor; while another whose delight is in his tool chest will rebel against the slavery of books and brain work. Both, when they become their own masters, will eventually abandon their distasteful tasks; and it is only a question of their continuity of purpose whether they become "rolling stones," drifting from one business into another all their days, or workers, firm and steadfast because buoyed up by a constant sense of enjoyment of their chosen labors.

Intermittent toil is wasted effort: so also are attempts to manage two or three different pursuits at once. There must be one definite aim; and toward this every thought must be concentrated, for nothing is more certain than that fame, wealth, and happiness are the rewards of only those who

"Still advancing, still pursuing,
Learn to labor, and to wait."

"OURSELVES, AS OTHERS SEE US."

It is pretty generally conceded that a newspaper may "blow its own trumpet" with moderation, and still not be considered egotistical, provided, however, that there really exists good reason for awakening the echoes with the brazen (adjective to be taken in its literal sense only) throat aforesaid. But when there is no substantial basis to warrant the instrumental flourishes, a discriminating public speedily unearths the fact, and, letting the aspiring soloist severely alone, permits him to exhaust his lungs in inglorious solitude.

These sententious observations occurred to us just now, while busily looking over a multitude of newspapers which have been pouring in lately from every quarter of the country. Scissors in hand, we have clipped from each journal a certain paragraph which to us is especially interesting—naturally, since it relates to ourselves. Each one of these scraps of paper is a blast from somebody else's trumpet for our benefit; and when we regard their number, we can hear an imaginary chorus which fairly overwhelms the feeble notes which we occasionally raise in our own behalf. This is very encouraging; there is a general verdict of "well done" which is more than reassuring, and certainly we may arrogate to ourselves the idea that we are far from resembling the luckless performer on the metaphorical clarion, whose efforts neither merit nor meet appreciation.

Compliments and kind wishes must, however, be acknowledged: and besides, perhaps there are some of our readers who may be sufficiently interested in our labors to desire to know what other people say and think regarding the same. Therefore, we print a few of the pleasant things written about us—if we had space, we would publish all—just to show the tone of the whole. At the same time, we gratefully tender our cordial thanks, not merely to the authors of the opinions below quoted, but to all of our professional brethren who have kindly said a good word for the SCIENTIFIC AMERICAN.

"We can cordially recommend it," remarks the *Mattoon* (Ill.) *Gazette*, "as an instructor that quietly and unobtrusively makes its weekly visits, and oftener than otherwise gives information that is so pat, so timely, and so much needed that you are disposed to sit down and drop the publishers a postal card, and inquire by what sort of divination they discovered just what you wanted to know."

The divination of nearly thirty years' experience in seeking just such information, is our answer to our contemporary's query.

The *Weekly Mirror*, of Lyons, Iowa, "can imagine no class of reading that would tend more to the advancement of boys in the useful arts and employments of life, or at the same time is presented in a more attractive form. Drop the trashy publications and take the SCIENTIFIC AMERICAN, which cannot fail to benefit any who reads it."

This last sentence is especially true. No one ever made a cent by reading maudlin love stories or yellow covered novels. Hundreds have made thousands of dollars by ideas suggested while reading the SCIENTIFIC AMERICAN.

The *Moline* (Ill.) *Review* thinks that, "of its class, this paper is the best in the world; and it is a compliment to the good sense of our manufacturing city to know that few papers are more largely read."

This reminds us of the remark of an eminent clergyman of this city, who said that whenever, in visiting a strange dwelling, he found a copy of the SCIENTIFIC AMERICAN about the room, he was assured that he was in the abode of people of intelligence and education. The *Corner Stone*, of College Corner, Ind., evidently has a like opinion, as it remarks

"Always full of the best of thoughts, it should find a place in every home."

The *Albany Sunday Press* chimes in with: "The man, or reading and studying child even, who is without it keeps himself at a disadvantage with others having it, for he who knows most of this world is sure of receiving the most of its productions. It would be impossible to compute the sum which is gained through the knowledge imparted by such a publication."

Here are a quantity of such laudatory opinions that, actually, we feel a sense of diffidence pervade us as we cull them from the various paragraphs; especially when the *Unionville* (Mo.) *Ledger* begins by saying that

"Words utterly fail us in attempting to describe this splendid periodical."

We—well, our natural modesty—we cannot—However, to proceed with others less embarrassing:

"Nearly thirty years ago we scanned its pages with extreme delight, and we have never since laid it down with a feeling of disappointment."—*Bellefonte* (Ark.) *Record*.

"This is one of the most valuable papers that a farmer or mechanic of any kind could possibly have in his household."—*Harrison* (Ark.) *Highlander*.

"Nothing like it can be found elsewhere."—*Waverly* (Iowa) *Republican*.

"One of the best papers for the farmer, the merchant, machinist, laborer, and in fact for everybody."—*Oregon* (Ill.) *Grange*.

"It is a promoter of knowledge and progress to every community where it circulates."—*Galena* (Ill.) *Daily Gazette*.

"There is rarely a number issued that is not fully worth a year's subscription."—*St. Charles* (Mo.) *News*.

"It contains more solid information than can be obtained in almost any other way for the same money."—*Trenton* (Mo.) *Republican*.

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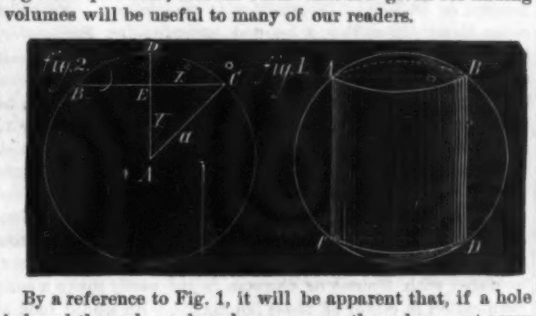
The above is but a portion of the collection before us, but we will not take room for more in the present number.

A PROBLEM RELATING TO THE SPHERE.

A correspondent, in a recent letter, asks us to solve the following problem: "What sized auger will bore out just half of a ball eight inches in diameter?"

This is a new question, so far as we know, with regard to the volumes that can be cut from a sphere; and though there is nothing very difficult in the solution, it affords an opportunity for showing the general methods employed in discussing such questions, and the rules that are given for finding volumes will be useful to many of our readers.



By a reference to Fig. 1, it will be apparent that, if a hole is bored through a sphere by an auger, the volume cut away is that of a cylinder, the diameter of whose base, A B or C D, is equal to the diameter of the auger, together with the two spherical segments, each of which has the same base as the cylinder, and a hight equal to half the difference between the diameter of the sphere and the hight of the cylinder. Now if we can obtain expressions for the volumes cut away, in some value of the diameter of the cylinder, we can readily form an equation from which the diameter can be ascertained. To do this, the following notation will be employed; and to make the solution as general as possible, we will suppose that, instead of half of the volume of the sphere being cut away, any portion whatever, represented by m, is removed:

x = radius of auger.

$2y$ = hight of cylindrical part of cut.

a = radius of the sphere.

$a-y$ = hight of each spherical segment cut away.

The volume of a cylinder is equal to the area of the base multiplied by the altitude, and will be, in the present instance, $3{\cdot}1416 \times x^2 \times 2y = 6{\cdot}2832 \times x^2 \times y$.

The volume of a spherical segment is found by adding three times the square of the radius of its base to the square of its hight, and multiplying the sum by 0·5236 times the hight. Hence, the volume of the two segments in question will be $[3 \times x^2 + (a-y)^2] \times 0{\cdot}5236 \times (a-y) \times 2 = 3{\cdot}1416 \times x^2 \times (a-y) + 1{\cdot}0472 \times (a-y)^3$.

The volume of a sphere is equal to the cube of its diameter, or eight times the cube of its radius, multiplied by 0·5236, or $8 \times a^3 \times 0{\cdot}5236 = 4{\cdot}1888 \times a^3$.

The volume of that part of the sphere which is to be cut away by the auger is $4{\cdot}1888 \times m \times a^3$.

Now, having two different expressions for the volume cut away, we obtain the equation of condition by putting them equal to each other: $6{\cdot}2832 \times x^2 \times y + 3{\cdot}1416 \times x^2 \times (a-y) + 1{\cdot}0472 \times (a-y)^3 = 4{\cdot}1888 \times m \times a^3$.

As there are two unknown quantities, x and y, it will be necessary to form another independent equation of condition. Fig. 2 is a section of the sphere, in which B C is the diameter of the auger, E C or x the radius, A C or a the radius of the sphere, and A E or y half the altitude of the cylindrical portion of the cut. From the right angled triangle, E A C, we obtain $x^2 = a^2 - y^2$.

Substituting this value of x^2 in the first equation of condition, and performing the operations indicated, the equation assumes the form: $6{\cdot}2832 \times a^2 \times y - 6{\cdot}2832 \times y^3 + 3{\cdot}1416 \times a^3 - 3{\cdot}1416 \times a \times y^2 - 3{\cdot}1416 \times a^2 \times y + 3{\cdot}1416 \times y^3 + 1{\cdot}0472 \times a^3 + 3{\cdot}1416 \times a \times y^2 - 3{\cdot}1416 \times a^2 \times y - 1{\cdot}0472 \times y^3 = 4{\cdot}1888 \times m \times a^3$, which reduces to $y^3 = a^3 - m \times a^3$. For the special case, given by our correspondent: $a = 4$, $m = \frac{1}{2}$, hence $y^3 = 32$, and $y = \sqrt[3]{32} = 3{\cdot}1748$ inches; and the diameter of the auger that will cut out half the volume of the sphere is

$x = \sqrt{(4)^2 - (3{\cdot}1748)^2} = 2{\cdot}4332$ inches.

As the numbers from which x and y are determined are not perfect squares and cubes, the roots are not exact; but by carrying them out to a sufficient number of decimal places, any desired degree of accuracy can be attained. The values given above, for x and y, are very nearly correct, as can be shown by the following proof:

Volume of cylindrical part cut away: $3{\cdot}1416 \times (2{\cdot}4332)^2 \times 6{\cdot}3496 = 118{\cdot}1033$ cubic inches. Volume of the two end segments: $(2{\cdot}4332)^2 \times 3{\cdot}1416 \times 0{\cdot}8252 + (0{\cdot}8252)^3 \times 1{\cdot}0472 = 15{\cdot}9371$ cubic inches. Total volume cut away: $118{\cdot}1033 + 15{\cdot}9371 = 134{\cdot}0404$ cubic inches. Half the volume of the sphere: $4 \times (4)^3 \times 0{\cdot}5236 = 134{\cdot}0416$ cubic inches.

The difference of only $\frac{12}{10000}$ of a cubic inch between the two independent calculations shows that the above values of x and y are exceedingly close to the absolute results; but any of our readers can reduce the difference still farther if they so desire.

SCIENTIFIC AND PRACTICAL INFORMATION.

A SULPHUR REGION.

The Winnemucca (Nevada) *Silver State* says: "Right here in Humboldt, within a hundred yards of the Central Pacific railroad, and in the immediate vicinity of the silver mines of the Humboldt range, are beds of sulphur, capable, it is believed, of supplying the whole world with that article for centuries. These sulphur deposits are located in the Humboldt valley, not much over a mile from the Humboldt House, and probably thrice that distance from the base of the Humboldt range. But little is known in reality of the extent of the beds, except that they cover a large area in the valley, and have been prospected in one place to a depth of several feet, where the excavations expose hundreds of tons of the pure article, which can be made available for commercial purposes at no greater expense than loading it on the cars and shipping it to the great commercial centers."

VALUE OF DISCIPLINE.

A suggestive instance of the value of discipline in times of emergency is found in the circumstances attending the loss of an Austrian man of war, recently, off Sicily. After the vessel had struck and it was found that she must shortly go to pieces, the captain ordered every man into the rigging. The command obeyed, the word was passed for all hands to strip and be ready to jump overboard at the signal. The instant the latter was given, every one leaped. A few seconds after, the ship keeled and went to pieces. Every man reached shore safely, except one who neglected to remove his clothes as ordered.

A NEW EXPLOSIVE.

A new kind of prismatic powder is being tested by the German military authorities. Its specific weight is greater than that of ordinary prismatic powder (1·69 against 1·65) and its effect is so powerful that it is said to render the Prussian 28 centimeter 11·02 inches cannon a match for the English 11 inch gun.

IGNORANCE IN MASSACHUSETTS.

The Deputy Constable, appointed to look after the children employed in the factories of Massachusetts, reports that fully 60,000 children are growing up in ignorance on account of their being set to work at too early an age.

NEW DISCOVERIES ON THE ACTION OF GALVANISM ON THE THROAT.

The faculty of Jefferson Medical College, Philadelphia, have recently conducted a series of interesting experiments upon the body of an executed criminal, which have revealed several novel and important facts in physiological science. Dr. W. W. Keen, after dissecting the chords of the neck which connect with the larynx, galvanized each in turn. When the left chord was galvanized, this only responded, and the same was the case with the right. It was found that there was no crossing of the chords from one side to the other, and that the action of each was distinct and independent. The doctor also examined and galvanized separately the external and internal intercostal muscles (between the ribs) and found that their function was not uniform but different. Physicians have long been at variance on this question, but the present discovery seems to settle the matter, since it proves that the external muscles are for expiration and the internal for inspiration. It has been believed by some that, by the application of galvanism, vitality can in a measure be revived. This impression is incorrect; for while the application of a battery, to the cadaver from which life has been extinct but a short time, will serve to produce muscular action, the result shows that only a portion of the body, and not the brain, is excited by external power.

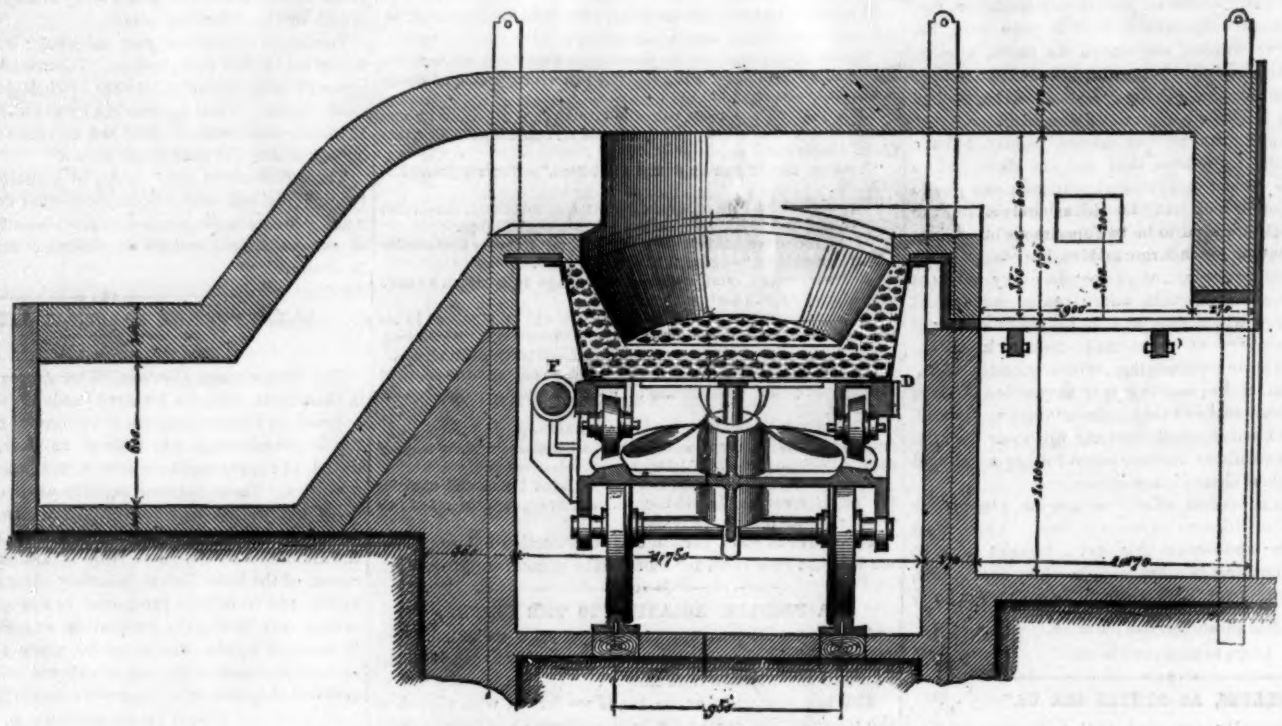
A BUTTER SALTING TEST.

A select committee of the New York Butter and Cheese Exchange is at present investigating the important question as to the best salt to be used for butter making. American and English salts are in competition, and the result which will be reached is of great pecuniary moment to dairymen generally. The report will appear during next April, and will be based on practical tests of butter salted by the various varieties of salt. The committee is to judge simply from the samples, no information being given as to the manner in which each has been prepared.

THE PERNOT ROTARY PUDDLER.

The new puddling furnace represented herewith has its characteristic feature in an inclined hearth, not more than one half of which is ever covered by the molten metal. This modification, it is stated, has given important advantages, as the higher part of the hearth forms a rapidly oxidizing surface for the thin layer of metal by which, because of adhesion and by centrifugal force, it is constantly covered,

The hearth is supported by two pairs of wheels, which rest on a circular track, and is guided in its rotation by its central spindle passing down through the center of the supporting bed. Rotary motion is given to it by a worm, F, which engages in the cogs on the circular portion, D, on which the hearth rests. The whole is mounted on trucks, as shown, resting on a suitable railway. The metal about the hearth has a lining of scoria or ore a few inches thick.



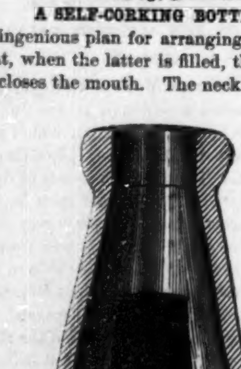
THE PERNOT ROTARY PUDDLER.

The hearth, mounted upon its car, is wheeled directly into the furnace, in a position as near as possible to the metal plate that supports the masonry above. When the hearth is at a reddish white heat, the interstices are closed with fragments of ore, and the operation of puddling is carried on by rotating the hearth some three or four turns per minute, care being taken to spread the contents evenly over the surface. The formation of blooms is the same as in ordinary puddling, except that, owing to the rotation of the hearth, the work can always be done directly in front of the door. Water circulation can be employed for cooling. The ordinary charge is about 1,100 pounds, and this is divided into seven or eight blooms, the average time of forming which is about half an hour, including the period necessary to transport them to the forge. A complete operation, comprising the squeezing, lasts about two hours, the cleaning of the grate and reheating of the furnace occupying about half an hour of this period.

At the foundery of St. Chamond, France, in one week, there were produced, in 11 heatings of 25 hours each, 25 tuns of fine puddled iron, while by hand puddling the same iron (gray charcoal) did not yield over 12 tuns. In the former case the loss did not exceed 30 pounds of raw per 1,000 pounds of finished product; in the latter the loss was fully 200 pounds. The consumption of fuel, at the same time, was reduced from 3,300 to 2,640 pounds.

A SELF-CORKING BOTTLE.

This is an ingenious plan for arranging the cork inside the bottle, so that, when the latter is filled, the stopper rises into place and so closes the mouth. The neck of the bottle, at the



point where it joins the main portion, is provided with projections, four in number, which prevent the cork placed above them from pulling through. During the filling, the weight of liquid coming from above keeps the cork down upon the ribs, and the fluid, of course, flows in between said projections. As soon, however, as the bottle is full, the cork necessarily rises with the contents, and, being tapered upwards, wedges into the mouth. To open the bottle, the cork is simply pushed down; then, as the bottle is inverted to discharge the liquid, the cork will rise upward and so leave a clear place of exit at the orifice. The ribs on the neck of the bottle act as strengthening pieces, and may be molded with the vessel in the ordinary way. Patented April 28, 1874, by Messrs. Henry and Thomas Miller, of Pittsburgh, Pa.

A Universal Language.

A language which could be understood all over the globe, says a contemporary, would be exceedingly useful in science, commerce, and social intercourse. Enthusiastic philosophers have more than once tried to invent a universal language, but have not succeeded; and the students or traders who desire to communicate have still to learn a number of languages, or to betake themselves to translations. To overcome these difficulties, a learned German, Dr. Bachmaier, has invented a method of correspondence in which numerals stand for words and ideas. Assuming (in round numbers) that four thousand words are sufficient for all purposes, he prepares a dictionary with columns of numbers from one to four thousand, each number having a word against it which it represents in every language. For example, if the word fire is number fifty-two, the same number will stand against *feu* in the French, and against *Feuer* in the German dictionary, and the same in any other that may be compiled. From this it will be understood that an Englishman entirely unacquainted with French or German might easily make a communication in either of those languages. He would look at his alphabetical list of words and set down the corresponding numbers. The Frenchman or German would look at his list of numbers, would set down the corresponding words, and thus have before him his correspondent's statement, and would have equal facility in answering. To make known masculine and feminine, nouns and adjectives, tenses and inflections, and other grammatical requirements, Dr. Bachmaier affixes certain simple marks to the numerals. He has already published three dictionaries—English, French, and German,—and is at work on other languages. At the meeting of the Oriental Congress last autumn, copies of these dictionaries were exhibited, and by the most competent judges were warmly approved.

Silica in Cancer.

In the November number of the Edinburgh *Medical Journal*, Mr. Fawcett Battye narrates his experience with an entirely new remedy in cancer. This is silica, powdered very fine, and administered internally twice or thrice a day, in one grain doses, combined with a third of a grain of morphia. He found it to diminish the pain in a marked degree, and by the tenth day to disperse it altogether. He does not precisely claim, however, that the patients recovered. They were relieved and benefited; and when they took it continuously, the disease was retarded. No satisfactory explanation of its action is advanced.

The Preservation of Smoked Meat.

Professor Nessler says that the keeping qualities of smoked meat do not depend upon the amount of smoking, but upon the uniform and proper drying of the meat. It is of considerable advantage also to roll the meat on its removal from the salt, before smoking, in sawdust or bran. By this means the crust formed in smoking will not be so thick; and if moisture condenses upon the meat it remains in the bran, the brown coloring matter of the smoke not penetrating. The best place to keep the meat is in a smoke house in which it remains dry, without drying out entirely as it does when hung in a chimney.

Scientific Progress in Australia.

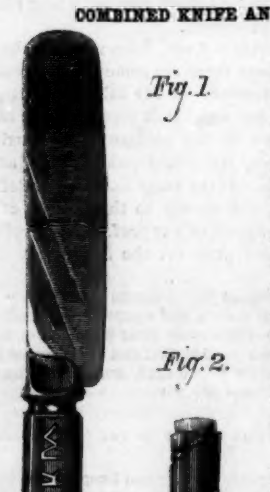
Our advices from Port Adelaide, South Australia, report the foundation of an institute in that city for the advancement of art, science, and literature. The first stone of the building was laid on October 31, 1874, a large sum of money having been given for the purposes of the institution by wealthy residents. Two gentlemen, Messrs. Elder and Hughes, have given $100,000 each to found a university, and the colonial government has appropriated 95 acres of land for a site and 50,000 acres as an endowment.

Mysterious Fire.

The Niagara Falls *Gazette* gives the following account of a mysterious fire which was discovered in a house occupied by Mrs. P. A. Porter, at that place: "About noon, one of the servants noticed a little smoke issuing from the floor in the butler's room, which adjoins the dining room, on the first floor of the house. Smoke had been noticed in the house the day before, but no indications of dangerous fires had otherwise been apparent. A messenger was sent for Mrs. Porter's business manager, who was at church. Upon his arrival search was instantly made for the fire, which was evidently making headway somewhere between the floor and ceiling below. The trouble was finally found under the dining room floor, in a place where it would seem impossible for fire to originate. The floor has a deep layer of sawdust beneath for the purpose of deadening sound. Beneath the sawdust, and about an inch and a half above the ceiling beneath, is a thin flooring, keeping the sawdust from the lathing and plaster. The fire was found burning the under side of this thin flooring, between the flooring and the ceiling. It had evidently been smoldering for two or three days, but had burned through to the sawdust in only two or three small places. How fire could originate in such a confined place, several feet from any chimney or flue, remains an unsettled question. The only plausible theory that has been advanced throws the responsibility for the trouble upon some mischievous mouse."

Apropos of the above, a French paper states that quite an alarming proportion of the number of private houses burned down is to be traced to the thefts of mice, who are particularly fond of the wax matches which are chiefly in use in Europe. They steal these matches and carry them away to their nests, where, at some more convenient time, they commence their meal, and a single nibble in contact with the phosphorus may ignite the whole collection.

COMBINED KNIFE AND PEPPER BOX.



This is an ingenious arrangement of a pepper or salt box in a knife handle. The latter is hollow, and into it screws the box, which is shaped as in Fig. 2. The receptacle is filled from the top and then inserted in the handle, a neat cap, attached to its extremity, passing over and making a finish to the end of the same. Perforations around the bottom of the box allow of the escape of the condiment when the box is slightly drawn out.

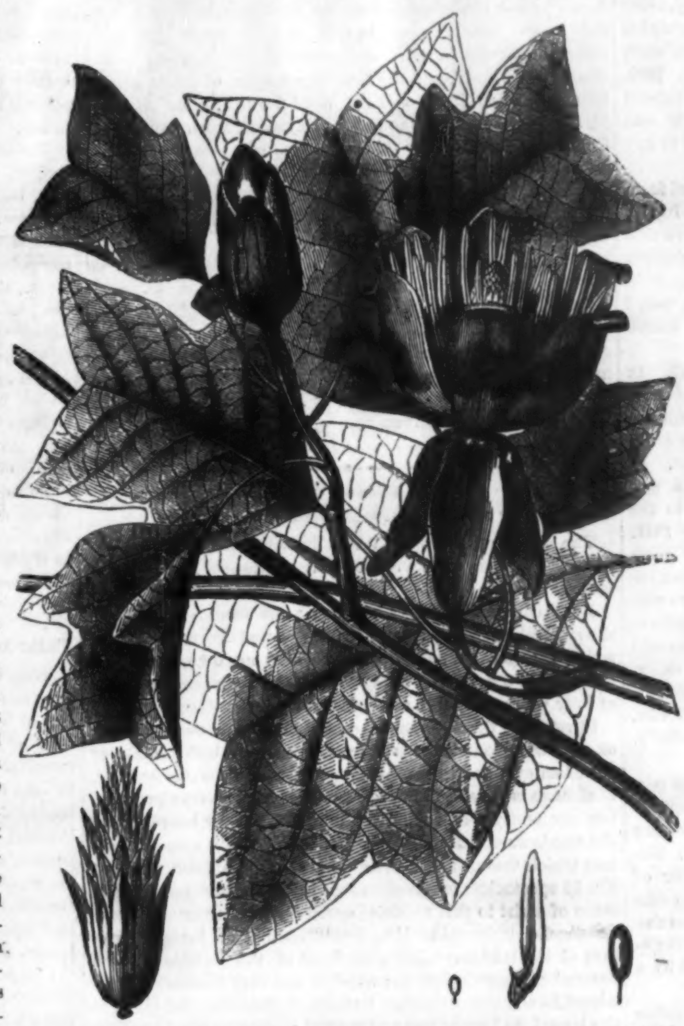
The device will be found useful for picnics and camping parties, as it saves the room taken up by the ordinary pepper and salt cellars, and besides secures a supply of the useful seasoning materials being constantly, and literally, on hand. Patented April 21, 1874, by Messrs. R. W. and R. F. F. Brown, of Utica, N.Y.

Carbolic Acid a Preservative for Hides.

In South America and Australia, it is stated that the immersion of hides for 24 hours in a two per cent solution of carbolic acid, and subsequently drying them, has been successfully substituted for the more tedious and expensive process of salting.

THE TULIP TREE.

This noble tree deserves a place on every lawn, as it seldom fails to develope itself into a stately specimen in any good, deep, well drained soil. In habit of growth, it closely resembles the common maple, but its conspicuous orange-tinted blossoms and scaly fruits at once suggest its near affinity to magnoliads, to which it belongs. The flowers are not unlike those of a tulip, and hence the name by which it is most generally known. The broadly expanded leaves, instead of being palmate as in the plane, are irregularly four-lobed, and somewhat resemble a saddle in conformation; and it is sometimes called in the vernacular the saddle tree, from this peculiarity. Our illustration gives an excellent idea of the flowers, foliage, and fruit. The flowers are profusely borne during the summer months; and although not strikingly ornamental on the tree on account of their being somewhat hidden amid the ample foliage, when cut and arranged in a vase with the foliage that naturally belongs to them, they have a distinct and striking appearance. This tree is from 100 to 150 feet in hight, but in Europe it rarely exceeds 70 or 80 feet. In the old arboretum at Chiswick, Eng., there used to be two specimens of this fine tree, one having much larger and brighter colored flowers than the other; and, doubtless, other varieties of it exist where plants are raised from seeds. All through the summer the foliage is of a fresh, pale green; and, in the autumn, it dies off a brilliant golden yellow. Striking effects might, therefore, be obtained by grouping it with *quercus coccinea* or the purple-leaved beech. In addition to its ornamental properties, its distinct and noble port commending it at once to the notice of intending planters, it is valuable as a timber tree, the wood being firm in texture and capable of taking a fine polish.



FOLIAGE, BLOSSOM, AND FRUIT OF THE TULIP TREE.

The Diving Bell.

M. Toselli states that he has been making experiments with his submarine vessel, or "marine mole," as he calls it (of which we gave a description on page 19 of our last volume). He is struck with the correspondence, of many of the phenomena, to those observed in ballooning; and considers that it is at the bottom of the sea that the problem of aerial navigation will be solved. In a liquid mass which is still, the machine moves quite well in obedience to the screw propeller, which is driven by the hand. But if the vessel meets a current, it is vain to think of contending with it. Another difficulty, as in balloons, is orientation. Once a balloon has got to some distance from the earth, it becomes impossible to tell the direction in which it is going. The needle is useless. And, similarly, in the "marine mole," when it is only 0·39 of an inch under the surface, and nothing is seen in motion but the fish, the compass is found of no use. To go to a certain point, an artificial meridian has to be arranged outside. M. Toselli remarks, too, on the great distinctness with which sounds are heard. At a depth of 110 feet, the screw of a steamer, passing about 660 yards off, sounded in the (hermetically closed) mole as if directly overhead. The contrivance of M. Toselli, affording, as it does, a novel opportunity of observation, may furnish some instructive data in physics.

The Remarkable Mineral Treasures discovered in Massachusetts—Rich Mines of Gold, Silver, Copper, and Lead.

Since the gold excitement a quarter of a century ago, says the Boston *Advertiser*, when the "forty-niners" flocked to the Pacific coast, there has been no discovery of the precious metals so important and yet exciting so little general interest, as the developments made during the past three months in the little town of Newbury, in Essex county, Mass. Four months ago the existence of any such ores was known to but two persons, and they were by no means aware of the magnitude of their discovery. When the matter got into the local papers, one gentleman of this city thought it worth while to investigate it, and the result has been, in brief, preparation for mining on an extensive scale, with prospects of returns far more remunerative than were ever known before.

The discovery dates back only to 1868, when a Byfield man, named Rogers, said to be a rather dissolute character, in his wanderings over Highfield Pasture first noticed the ore. Something in the weight of the stones which he picked up, and occasional gleams as the sun glanced on small, smooth surfaces, induced the belief that there was metal in their composition; and if metal, then something of value. With this idea he collected a number of the best specimens, and some time after took them to Mr. Albert Adams, a quiet bachelor farmer residing in Newbury. Mr. Adams became greatly interested in the matter, believing that a great discovery had been made. He began to study mineralogy and geology. Becoming convinced that metal was present in quantity, he was soon confident that it was silver and lead. He pursued his investigations very quietly; and finally concluded to secure by purchase the land on which the specimens were found. For this purpose advances were made to an old farmer named Jaquish, who had long owned the pasture, and the lot, measuring twelve acres, was transferred to him for $350 early in April of last year. He then began digging. The surface finds, or float ore, were naturally more or less oxydized by the action of the elements, but at a depth of six feet he struck the true vein. Several tuns were then taken to his barn and further examination made.

Dr. E. S. Kelley, of Boston, and Professor R. H. Richards, of the Institute of Technology, subsequently examined the premises and minerals. From their report it seems that the rocks in the vicinity are gneiss nodes, and quite hard. The strike or line of outcrop is about N. 70° to 80° E. the dip about 30° to the N. W. As he found it, the line of the vein was about N. 72° E. by the compass. Four specimens were assayed. The first, coarse grained galena, assayed for silver, yielded $56.37; and the second, fine grained galena, $75.23 per tun. The third, a comparatively pure piece of gray copper, containing also some quartz and galena, assayed for silver, copper, and incidentally for gold, yielded, of silver, $1,270 per tun; gold, $129 per tun; and about 27 per cent of copper. The fourth specimen, weighing about three pounds, tried for lead, was found to be nearly pure and hammered quite readily. The lead was fifty-two per cent of the whole matter.

After this a large extent of the adjoining property was secured, and in September last systematic mining operations were begun by the sinking of a shaft ten feet square. As the shaft increased in depth, the vein—which is what is known as a fissure vein, that is, metal between two walls of granite, where in all probability it was thrown by volcanic action—broadened from three feet at the surface to seven feet at present working, twenty-five feet down. As the men descend, the vein grows richer and purer, the proportion of silver and gold increasing, while that of lead remains about the same. The south wall has not yet been reached. The men are therefore working on the pure metal, the north wall being perfectly perpendicular. In consequence of this fact, which is totally without a parallel in mining history, there is but the smallest possible expense incurred in removing the ore—about one dollar per tun. About ten tuns are taken out, being hoisted up in baskets, every twenty-four hours. To work this quantity, only four men are required by day, and a relieving gang of equal number by night. This ore, which is piled in a storehouse, as at present mined yielded $90 per tun of silver, $70 of lead, and $11 of gold; a total of $171. The cost of smelting and separation is $20 per tun, so the profit is about $150 per tun. Near this first shaft, on the forty acre lot, they have sunk the second shaft, begun in last October. This is of about the same size as the first and is down almost as deep, the vein working about four feet in width and the ore being of similar purity. This vein, like that first found, broadens as it is dug out. Four men work in this shaft at night and four during the day. Shaft houses have been erected over the mines, and a large storehouse and a boarding house for the men built near by. Housing the shafts will enable the men to continue work during the winter.

Mining experience has demonstrated that a fissure vein is always without bottom. This vein is estimated by geologists to extend in its general direction, 20° east of north, about six or seven miles in length. Bearing this fact in mind, the wealth to be reasonably expected from this "find" can only be estimated by comparison. The Comstock lode in Nevada, hitherto supposed to be the richest silver mine in the world, yields only $45 per tun on the average, while the Newburyport yields just double that. The Mariposa mines, which were sold a few years ago to a company for $10,000,000, yield only $15 per tun of silver. The Belcher mines in Colorado, which yield about $40 per tun, divided $900,000 among the stockholders as the profits of work during the month of August, 1874; and these mines had not the additional profits accruing from the product of lead.

Chalk in Artificial Fuels.

We have remarked paragraphs in sundry home and foreign scientific journals relative to the utilization of chalk, such as is found in natural beds, as a source of heat. Various descriptions of improved fuel have appeared, in which the above material has been mixed with bituminous coal and various earthy substances, and the compound thus produced is stated to have increased calorific properties. How this result can be directly ascribed to any active effect of the chalk, we fail clearly to comprehend.

Chalk is a body already the result of a combination of carbonic acid and lime. By heating at a high temperature, the material may be decomposed; and it absorbs an amount of heat equivalent to that produced at the moment of combination. Carbonic acid and lime result, and these themselves are also burnt bodies, neither of which can individually produce heat. If the carbonic acid, after contact with an incandescent combustible, is transformed into carbonic oxide, it is simply through the absorption of exactly the quantity of heat which would be produced by the transformation of carbonic oxide, in turn, into carbonic acid. So that, theoretically and according to all present chemical ideas, it is impossible to conceive that lime, no matter in what form it be utilized, can be a source of heat.

It remains therefore to account for the advantageous results which are claimed to have been secured by the admixture. In domestic heating, the types of apparatus commonly employed are the grate and the stove. A grate fire utilizes about one tenth of the heat developed by the combustible, that is, about this fraction goes to warm the room, while the remaining nine tenths flies up the chimney. It is radiant heat that warms our apartments. Now if, by mixing chalk or limestone with the fuel, the combustion is retarded, the chalk, by absorbing a portion of the heat which otherwise would be lost, serves to increase the radiating surface, it thus probably augments the quantity of heat utilized.

In stoves an analogous state of affairs exists, and it is not impossible to conceive that such, in the instances noted, may be advantageous. But for the production of steam, wherein active combustion is required, it is certain that the addition of such foreign matter to the fuel can exercise no useful effect.

Talent and Tact.

Talent, it has been said, knows what to do, tact knows how to do it; talent is wealth, tact is ready money; talent has many compliments from the bench, tact touches the fees of the client; talent makes the world wonder that it gets on no faster, while tact excites astonishment that it gets on so fast. Tact makes no false step; it takes all hints, and, by keeping its eye on the weathercock, is able to take advantage of every wind. This promptness in seizing an opportunity, and diligence in following it up, is scarcely less valuable than industry. Instances might be given indefinitely of the results that have followed the immediate utilizing of an accidental discovery in mathematical demonstration, in chemical analysis, in mechanical invention, and in manufacturing operation.

Correspondence.

Remarkable Optical Phenomena.

To the Editor of the Scientific American:

Last evening, a curious optical phenomenon was visible at this place at sundown. For three days the weather has been very sharp (thermometer 10° to 12° below zero); and yesterday afternoon, flaky clouds lay in the west. Just at sunset, the full disk of the sun, considerably magnified, was seen behind a thin veil of cloud, but shorn of its rays, lusterless, and resembling the full moon, which it did not much exceed in brightness. The full disk was so clearly seen in all its parts that it was a matter of surprise that it was not brighter. This surprise was increased on observing, about twenty degrees to the right and a little above, a dazzling brilliancy, as if the sun were struggling to burst through a rift in the clouds. It was hard to believe that the real sun was the lack-luster orb that was slowly passing down through the distant hemlocks, and not the one of which the radiance was making the whole west a blaze of light. The phenomenon lasted for some ten or fifteen minutes, and until the disk of the sun had completely passed out of sight. The luster then slowly faded away. The explanation that I give is that two clouds of snow crystals lay in such positions that the one cuts off the light from the sun, the other reflected it to our eyes.

To-night, another optical phenomenon has attracted my attention. The frame of a picture in my room has the appearance of being bent, when seen across the room, the lamp being on one side. This is beyond our power of explanation at present. At the point where the light strikes upon the frame, which is a gilt one, it seems bent or broken.

Troy, Pa. O. B. J.

Early Submarine Telegraphy.

To the Editor of the Scientific American:

In your journal of January 9th, Mr George B. Prescott gives a brief account of some of the earlier experiments in sub-aqueous telegraphy. As this is a matter of much scientific as well as historical interest, I trust you will afford me space for a few notes on the same subject.

Prior to the employment of gutta percha for this purpose, various attempts were made to insulate sub-aqueous telegraphic conductors, which were attended with only partial success. The plan usually adopted was that of winding the conducting wire with thread saturated with insulating compound, and inclosing it in a tube. Dr. W. O'Shaughnessy made the first actual experiments of this kind for telegraphic purposes. He built a line, 21 miles in length, of iron wire, supported on bamboo poles, near Calcutta, India, in 1839. His line also embraced 7,000 feet of submerged wire, insulated with cotton thread saturated with pitch and tar. This was the first telegraph line of any length ever constructed in any country, and was worked successfully.

The first public telegraph line in England was opened from London to Gosport, 88 miles, in February, 1845. In the summer of 1846, an attempt was made under the direction of Professor Wheatstone to extend this line across the harbor to Portsmouth by means of a submarine wire a mile in length, but it failed to work successfully. This wire was, I think, insulated with india rubber, and enclosed in a leaden tube.

Gutta percha was first introduced into England in 1845. In March of that year R. A. Brooman patented the method now universally employed, for preparing the raw material for use in the arts. Covering everything into which gutta percha could be manufactured, this was called the Master Patent. In September of the same year, Henry Bewley patented a machine for making tube, hose, etc., similar in principle to the American lead pipe machine of Tatham, patented in 1841. In 1846 C. W. Siemens of London sent a sample of gutta percha to his brother Dr. Werner Siemens, who had been appointed a commissioner by the Prussian government to consider a telegraphic system, to see whether it would answer for coating subterranean wires. The latter soon discovered its remarkable insulating properties, and recommended an experiment upon a large scale, which having been sanctioned, he laid down a line of about five English miles near Berlin, Prussia, in the summer of 1847, which worked successfully. (*Journal of Society of Arts*, April 23d, 1858.)

In 1847 and 1848 more than a thousand miles of gutta percha covered wire was laid down in Prussia, which for several years proved successful, after which it gradually failed owing to the impurity of the material. In March, 1848, Dr. Siemens made several successful experiments in the harbor of Kiel for the Schleswig-Holstein government, using a gutta percha cable of considerable length for firing submarine torpedoes. The same year he laid across the Rhine, at Cologne, a gutta percha coated wire, which was protected by a strong chain.

In 1846 the Gutta Percha Company was formed in London for the purpose of working the Brooman, Bewley, and other patents. In June, 1846, Mr. Samuel T. Armstrong of New York received from one of the directors of this company a small quantity of the raw gutta percha, together with an invitation to visit the works in London. He left for Europe in March, 1847, spent six months in England and on the continent, visiting all the gutta percha factories then in existence, and finally purchased the patents for the United States, returning to New York in September, 1847. While in Europe he doubtless witnessed the manufacture of the insulated wire for Dr. Siemens, an immense quantity of which was furnished in 1847 by the same Gutta Percha Company of London.

In the latter part of 1847, W. S. Wetmore, of New York, imported a consignment of gutta percha for Mr. Armstrong. It was probably some of this lot with which Mr. Craven experimented, as mentioned by Mr. Prescott. I have been told that Mr. Craven and his wife covered a wire themselves at their home in Newark, N. J., which he laid down as an experiment at the Passaic river crossing, in that city. On the 22d of May, 1848, Mr. T. M. Clark, Secretary of the Magnetic Telegraph Company, wrote to the Treasurer, George H. Hart, Esq., of Philadelphia:

"The wire has been down there (at Passaic river) nearly a month, and it has worked to a charm. It has been tested in various ways to see if there is any difficulty about it, but none has ever yet appeared. I am well satisfied that the plan is a good one, provided the wires can be kept out of the reach of anchors." This cable was therefore probably laid the last of April, 1848. Mr. Prescott states that James Reynolds covered the first cable that was laid across the Hudson River from New York to Jersey City, but makes no mention whatever of Mr. Armstrong, who was the proprietor of the establishment at which the cable was covered, and the owner of the Brooman and Bewley patents under which it was made, Mr. Reynolds (who was then employed by him) being the man who built and probably ran the machine used in coating the wire. This machine was the same in principle as Bewley's and Tatham's, previously mentioned. The cable referred to consisted of a No. 9 iron wire covered with half an inch in diameter of gutta percha. It was laid at 5 o'clock on the morning of the 15th of June, 1848, by the steamboat United States, from Cortlandt street, New York, to Jersey City, under the personal supervision of T. M. Clark and John W. Norton, directors of the Magnetic Telegraph Company. This cable had a leak in it from the start, but New York and Philadelphia telegraphed through it—by alternately cutting off the battery at the receiving station—for four days, when the wire was cut by an anchor.

Mr. Craven applied for a patent on the 12th of May, 1848, for his process of insulating wire by means of gutta percha. William Gordon also applied for a patent for the same thing on the following day, May 13. Both of these applications were rejected on the ground that, the insulating property of gutta percha being well known, its use to protect wires was not a patentable invention. Reynolds applied for a patent on his machine, June 9, 1848, which was rejected for lack of novelty. But notwithstanding all this, one George B. Simpson of Washington succeeded in engineering a bill through Congress, giving him a patent for insulating wires with gutta percha, which was issued May 21, 1867, and is now in force. Even if the subject matter were patentable, it is difficult to see how any one in this country could rightfully claim the invention, as it was made by Dr. Siemens in the winter of 1846-47, and the first importation of gutta percha into the United States was not until near the close of 1847. Mr. Prescott says: "One of Mr. Reynolds' workmen named Champlin, shortly after this cable was laid, went to England and communicated the process to the Gutta Percha Company" etc. This statement cannot be correct; for as we have seen, the cable in question was not laid till June 15, 1848, while the Gutta Percha Company probably covered Dr. Siemens' four miles of wire in the summer of 1847, and certainly the 1,000 miles subsequently laid down by him in 1847 and '48.

W. H. Barlow took out a patent in England, April 27, 1848, for covering wire with gutta percha by means of heated grooved rollers. The Bewley machine has, however, been much more generally used for this purpose than any other, having of course received more or less improvement at the hands of subsequent inventors.

Elizabeth, N. Y. F. L. POPE.

Our Visual Organs.

To the Editor of the Scientific American:

The communication of W. S. Turner, published in your issue of January 9, covers only a portion of the subject treated upon.

By hearing a discussion between some medical men upon the general theory of inverted vision, I was led to conduct a series of experiments, more to enlighten my own mind than to convince others. Of many test experiments, during three or four years, only two or three can be here referred to.

I first tried the stereotyped experiment with the eye of an ox, and soon found a vast difference between looking into or out of an eye, and looking through one. In the latter case, the image is inverted; in the former, it is in its true position. I subsequently constructed an immense eye by boarding up the windows of a large workshop, leaving only a small hole, into which was fitted a double convex lens, from a pair of No. 15 spectacles, my own vision being substituted for the sense of sight to this artificial eye. By placing myself some distance back from the lens, I saw upon it an inverted picture of the landscape lying in front of the building, and a covered carriage before the window was very distinctly represented in the foreground. But by placing my eye close to the lens, I no longer saw an inverted picture painted upon it, but was enabled to look out, through the lens, upon the outer world and view the entire landscape within range of my vision, not inverted, but in its true position. To compare this with the legitimate office of our visual organs: if a person could be found who could not actually look out upon his surroundings, but, to the contrary, saw the picture as painted upon the crystaline lens situated within the interior of his eye, would any scientist suppose that the person's visual organs were performing their proper functions? If not, is it logical to suppose that we receive cognizance of the outer world only through the telegraphy going on between the internal nervous tissue of the eye (retina) and the brain through the optic nerve? A person reading a book while lying supinely, with his head falling over in an inverted position, would naturally hold his book before his face to suit his inverted vision; and this is just what Nature does by crossing the optic nerves, carrying the right nerve to the left lobe of the brain, and *vice versa*.

By investigating still farther, it was found that the anterior portions of the eye (except the outer cuticle, which is tough and hardy) are supplied with a microscopic network of sensitive nerves, well lubricated by a subtle nervous or magnetic fluid, and that this delicate system of nerves forms a conjunction with a more extensive system of nerves running from the spinal column, and these, through the latter, come into communication with every portion of the brain.

I am thus led to the conclusion that through this wonderful arrangement we are enabled through our senses to approach close to and look out through the crystaline lens of our visual organs upon the outer world, unconscious of the fact that an inverted image of things seen is daguerreotyped upon the retina of those organs; and further, that the office of the retina, like the mirror in a telescope, is to collect the rays and reflect them upon the lens, thereby rendering a perfect image. CHARLES THOMPSON.

St. Albans, Vt.

Electroplating Iron Surfaces.

To the Editor of the Scientific American;

I have considerable experience in the beautiful art of electroplating; and having received numerous letters from your readers, asking for information respecting the method of depositing silver upon iron, I give you the following:

It is by no means an easy matter to coat iron with silver. It may, however, be successfully done if sufficient care be taken. Silver may be deposited upon iron either directly or indirectly, the latter plan being much the best, especially for the inexperienced electroplater. In depositing silver upon iron, observe the following instructions: The article should first be rendered free from rust by rubbing with emery cloth, or by dipping it into a pickle composed of sulphuric acid, 2 ozs., hydrochloric acid 1 oz., water 1 gallon. After the article has remained some time in this pickle, it should be taken out and the rust removed by a brush and wet sand. If the oxide cannot be easily cleaned off, it must be returned to the pickle. As soon as the article is rendered bright, it is washed in a warm solution of soda, for the purpose of removing all grease. Lastly, it is well rinsed in hot water, and immediately placed in the plating solution, which should contain only about one fourth as much silver as that used for plating copper and brass articles. The battery power must also be weak. When the object receives a slight coating, the process may be carried on more rapidly by increasing the battery power, and by placing the article in a much stronger plating bath, using about 1 ounce of silver in a gallon of solution.

The indirect method consists in first coating the iron with copper, which insures success. Copper adheres firmly to iron, but silver does not; hence copper acts the part of a go-between. After the article has been cleaned, as above described, it is coated with copper by placing it in a solution composed of carbonate of potassa 4 ozs., sulphate of copper 2 ozs., liquid ammonia about 2 ozs., cyanide of potassium 6 ozs., water about 1 gallon. The sulphate of copper may be dissolved in warm rain water, and, when cold, the carbonate of potassa and ammonia added; the precipitate when formed is redissolved. The cyanide of potassium should now be added, until the bluish color disappears. Should any precipitate be found in the bottom of the vessel, the clear solution may be poured off from it. The solution is worked cold, and with moderate battery power. Let the article remain in the bath until a thin film of copper is deposited, then remove quickly, rinse in hot water, and place in the silvering solution, where the process may go on as rapidly as if plating a copper article. JAMES POOL.

Friendsville, Ill.

Patents and Patent Laws.

To the Editor of the Scientific American:

Some time since a large and enthusiastic meeting of the shoe and leather dealers was held in Boston, Mass., the object of which was to protest against the alleged unjust conduct of the owner of certain patents connected with the manufacture of boots and shoes. The inventor, after trying in vain to collect his dues for the use of his inventions, proceeded to take legal measures to obtain them, and has been insolent enough to sue some very wealthy and influential parties, and to attach their property. The remarks made and the resolutions passed were very strong and earnest, and have attracted much attention; and in addition, there was a general attack upon inventors and patentees, and the whole patent system received no small amount of condemnation.

I do not know the inventor, nor am I in any way whatever interested in any kind of pegging or other machinery for the manufacture of boots and shoes. But I have read the proceedings of that meeting, and stood pretty well the patriotic allusions to "Bunker Hill" and the "Heroes of the Revolution," etc.; but I have always noticed that when, in business, the American eagle is very much spread, and "Bunker Hill" and the "Boston Tea Party," etc., are much paraded, the cause behind is either very weak or positively bad. I think also that in this case two questions will at once arise in the mind of every honest and fair-minded man. First: If the invention is good for nothing, and there are other devices just as good or better, why have the shoe manufacturers used this invention? Secondly: If they have used and still do use it, why not pay him the royalty like honest men? It may be that the inventor has been very unjust in his proceedings, but it is but fair to infer that his claims for royalty upon his highly useful invention have been long and persistently refused by those who have made money by its use; for unless this is the case, no sane man would institute the measures he has taken to obtain redress.

In one corner of the village graveyard in Billericay, Mass., there is a monument which bears the following inscription

1845.
In memory of
MAJ. SAMUEL PARKER,
who died October 14th, 1841, aged 69.
This stone is erected by those who have been benefited by his mechanica genius.

Who was Major Samuel Parker? He was the original inventor of the leather-splitting machine; and by his genius and his labors, tens of thousands of leather dealers and shoe manufacturers have been enriched, and the wealth of our nation and of the world very greatly increased. His invention has saved tens of millions of dollars worth of property from utter waste. For all this, Major Parker received nothing from the leather dealers and the public but outrage and wrong. They infringed upon his patent, hunted him from court to court, and robbed him of all he had. Four years after his death some of them came and placed the small, cheap granite monument above mentioned upon his grave. Truly, of the leather dealers and the business world, in return for the immense services he had rendered them, the great inventor asked bread, and they gave him (after his death) a stone. Doubtless they thought it an ample return for all he did and suffered. Looking back, I cannot help thinking that the men who had robbed and wronged him for years only insulted his memory in placing a monument upon his grave, though it is some gratification to know that in doing this they also unconsciously recorded upon the stone their own meanness and dishonesty!

In view of the facts above narrated, it is certainly most gratifying to learn, from the speeches and resolutions at the late meeting, that the shoe and leather dealers of the present

time are in the highest degree noble, honest, and honorable men, who in all their dealings love nothing so much as justice. Yet it seems evident that the meeting was intended to be an encouragement to the crusade which is beginning throughout the country, the object of which is to destroy or to render nugatory the rights of inventors and patentees. The Granger combination, supposing that invention and improvement in agricultural implements have reached their highest point, have begun a systematic warfare upon patents and patentees, and the great manufacturing interests seem disposed to follow the lead of the Grangers in their efforts to break down the legal protection—always slight enough—which the inventor has of the profits upon his invention for a short term of years. But however much certain class interests may be benefited, or seem to be, by the destruction of the rights of inventors and patentees, the public cannot afford quite yet to spare them. Amazing as has been the progress of invention, the field is hardly yet entered upon, and in every direction new inventions and improvements upon old ones are called for, and the vital interests of the world demand that all the rights of those who produce useful inventions should be sacredly guarded.

One gentleman at this meeting proposed that, when a man applies for a patent, notice of his application should be given broadcast over the country for six months. Of course to do this a description of his invention must necessarily be given. Now there is nothing perhaps so cheap in this country as perjury; and a small chance indeed would the real inventor have, after his secret has been published to the world for six months, to obtain his patent. Scores of scoundrels with well trained witnesses would claim the invention, proving that they had long used the same thing, and perjury would win the day. As it now is, the inventor who seeks to obtain a patent is obliged to use the greatest care and secrecy to prevent being cheated out of his rights. As to the inventor's contemplated effort to get his expired patent renewed, the question is not (as stated at the meeting) whether his family are starving or not; but whether he has received a full and sufficient compensation for the great benefit his inventions have been to the boot and shoe manufacturers, and to the public. I hope, therefore, that the Committee on Patents will not be influenced in their decision by the loud clamor of deeply interested men about Bunker Hill and the Boston Tea Party; but that they will judge the matter upon its merits only, and decide it justly. The claim for the renewal or extension of a patent for a useful invention is a right in equity which belongs to the inventor who has not been adequately rewarded for his invention. It is a right based on long usage in the management of patents by the United States Government, and all honest men will endorse the usage as a matter of justice, right, and true policy. The difficulties which beset inventors are many. Men devoid of either conscience or honor are constantly on the watch to find out good inventions, which are likely to become profitable. If the inventor is poor, these men commence a system of annoyance to compel him to sell out his patent for a trifle to avoid long and costly litigation in the courts; and they too often succeed in their nefarious attempts. Even if the inventor is not hunted by these human wolves and driven into ruinous litigation to maintain his rights, yet (if his invention is of any magnitude) such is the indifference and prejudice, with which almost every new invention of importance is received by the public, that a large portion of the seventeen years allotted to him expires before he can overcome them and start his invention. In fact it is too often considered that the inventor is a fair subject for jeering and insult, and that neglect and derision are the only suitable reward for the man who attempts to create some new thing for the use of the public. Empty your factories tomorrow of all the patented machinery therein, and see how much will remain of them besides the bricks and mortar of their walls.

Because among the large number of inventions patented there are some which are useless, and because in the patent business (as in every department of life) there are some dishonest men, the large mass of inventors and patentees—whose usefulness to society is greater than that of any class of men whatever—are denounced and almost outlawed by those who every day and every hour are receiving the benefits of their genius, skill, and labor. In view of this, it is high time that the public should take this important subject into consideration, and see that justice is done to the Inventors of the Nation. P.

Cure for Catarrh.

A medical authority asserts that the severest catarrh cold can be removed in about ten hours by a mixture of carbolic acid, 10 drops, tincture of iodine and chloroform, each 7·5 drops. A few drops of the mixture should be heated over a spirit lamp in a test tube, the mouth of which should be applied to the nostrils as volatilization is effected. The operation should be repeated in about two minutes, when, after the patient sneezes a number of times, the troublesome symptoms rapidly disappear.

Pigeon Post in France.

The French military authorities are about to organize a carrier pigeon post between frontier fortresses, on the plan already adopted by Russia, Italy, Austria, and Germany. Two thousand pairs of pigeons, it is said, are being trained for the purpose.

IT is one of heaven's blessings that we cannot foreknow the hour of our death; for a time fixed, even beyond the possibility of living, would trouble us more than doth this uncertainty.

Success in Life.

What is success? The answer to this question, says one of our English contemporaries, depends on the different courses which men pursue, and the ends they have in view. The general object of pursuit is that which people most want —money. The money test of success is that which they best understand. To make a certain income, therefore, is among the first duties which the world prescribes. People cannot all appreciate the poet or the thinker, and they estimate his works accordingly by the prices which they realize. There are other ideas of success, however, than this trading notion. The soldier seeks it in promotion by deeds of valor; the scholar in the discovery or enunciation of truth; the poet in the praises of his generation; the lawyer in professional advancement; the politician in the ascendency of his party and his accession to office. When Agassiz, engrossed in scientific pursuits, was told that he ought to look more after the practical ends of life, in leaving a provision for his family: "I have no time," he replied, "to make money."

The making of "getting on" an end in life is purely an English notion. The ideal of man is generally in happy continuance. As to making advancement in the world, as we understand it, the object of existence, an Asiatic would think his life thrown away. "Why should he get on? He is where he is by the Almighty's will, and why should he interfere with the Divine appointment?" It is this anxiety to succeed which gives to English practical life its fierce competition and earnest tone. The attainment of almost any position or dignity being made possible, to suitable talent and well directed effort, inspires hope. What a blessed possession is hope! It is the salt of human life that sweetens all toil and difficulty. Phœnix-like, it "springs eternal" from the ashes, of the pyrites we place in the crucible, as gold; it is the panacea to the disappointment that makes the heart sick; it is the dawn of the radiant orb which, after a season of darkness, is yet to shine in noonday splendor; it is the buoyant element that keeps our bark afloat till we reach the harbor, for without hope there can be no endeavor. *Excelsior* is only hope intensified. Whatever a man's position or calling may be, he should aim at the first rank and the foremost place. "It can't be done" is a cry of indecision, indifference, and indolence. Such a plea is a mere excuse for not attempting at all. Difficulties should serve but to reveal a man's true strength, to test his power of will, to train him to the exercise of his noblest faculties. Failures discipline the strong; only the weak and unstable are overwhelmed. Diligence in business should form part of a man's religion, as it is indissolubly associated with the spiritual in worship.

To attain a position in society, or achieve success in a profession, other qualities must be added to those required to work out results in material nature, because a different class of opposing forces are here encountered. They are not of the nature of those that are overcome by the engineer in the tunneling of a mountain or the bridging of a valley: but such uncertain and subtle elements as public opinion, the want of means, adverse criticism, infirmities of temper, failing health, indecision of character, and other hindrances equally fluctuating, latent or deceptive. Perseverance is essential. All the performances of human art are instances of its resistless force. Attention to the minutest particulars of duty, conscientious watchfulness in little things, that are not really little although trifling in appearance, surmount all obstacles. He who is not disheartened, but boldly and fearlessly grapples with difficulties, never fails. The determination which plods unweariedly through drudgery and details is the foundation of greatness of character and of ultimate success. It accomplishes more than genius.

The New Paris Waterworks.

The great reservoirs at Montsouris for the reception of the waters of the Vannes possess great interest for the hydraulic engineer. It will be remembered that in July last a portion of the arched roof gave way. The accident has now been repaired, and the water will be let into the upper reservoir in a few days. The arches have been reconstructed as before—that is to say, two bricks thick—but the piers and supporting walls have been strengthened, and the vaulting supported in such a manner that, should one or more arches fall in, they will not carry the rest with them. The area of the reservoirs is 363,800 square feet, and they are two stories high, with an enormously thick wall in the middle of the whole, which divides the reservoir into four chambers, two below and two above. All the masonry of the lower chambers has been finished for a long time, but the conduits and pipes for the distribution of the water remain to be executed. The upper chamber, of which the vaultings have been reconstructed, and which has an area of 181,900 square feet, and will contain 75,000 tuns of water, will be the first filled. The hundred arches which cover this chamber are being covered gradually with mold to the depth of 10 inches; and when this is done, and the arches show no tendency to give way, the mold will be sown with grass seed. The quantity of earth will be about 2,600 cubic yards. Several hydrants are placed around the edge for the purpose of irrigating the grass. The second upper chamber is now being constructed, and is about one quarter finished. Around the reservoirs, earth is now being thrown up to the hight of the roof of the lower chambers, with the double view of adding support to the walls and of keeping the water within fresh. At one of the angles of the main structure rises a structure 132 feet square, and with walls 6 feet 7 inches thick. This is the receiving chamber, and has been for some time in use. Its capacity is about 320 feet square by 13 feet 2 inches deep; the bottom and sides are covered with bluish white tiles, and the water is so pure and translucent that a motto inscribed on the tiles at the bottom is plainly visible. At the bottom of this smaller reservoir may be seen the orifice of a pipe 5 feet 9 inches in diameter, which will carry the water to a point 16 feet 5 inches above the level of the ground; opposite to this is another pipe of the same dimensions, which, when there is an overflow of water, will carry it to the main sewers. Just in front of this receiver are three pipes, two of them 3½ inches in diameter and the third somewhat less, bound together by means of a cast iron hood and fitted each with valves; one of these will serve to fill the upper chambers of the main reservoir, a second the lower chambers, and the third, and smallest, already supplies the highest portions of Passy with water. At the base of the recipient chamber is a telegraphic office, which is in communication with another at the reservoirs at Arcueil, with the prefecture of police, and several other public establishments, to aid in the regulation of the whole service of the city. The public is admitted to view the recipient chamber, and the purity of the water, which will shortly supply a very large proportion of the population, is a constant theme of admiration.

Gramme's Electric Machines.

M. Gramme has made a communication to the Paris Academy of Sciences respecting the improvements which he has made in his electric machines. The original machines ignited four inches of platinum wire 0·0118 inch in diameter; the improved machines will heat to redness four times that length of the same wire, without any increase in the weight of the materials or in labor. This augmentation in the intensity of the current is principally due to the employment of the new thin plate magnets of M. Jamin. The new electro-galvanic machines have only one central ring instead of two, and two electro-magnets in place of four, in the former machines. They weigh only 390 lbs. instead of 1,650 lbs; only measure 19 inches by 1 foot 9 inches in hight, in place of 2 feet 4 inches by 4 feet 5 inches; but deposit 4 lbs. 9 ozs. of silver per hour in lieu of 1 lb. 5 ozs. The power required to work the new machines, as compared with the old, is only as 50 to 75. They have the following advantages: (1) They only require half the space; (2) they are three fourths lighter; (3) they economize three quarters of the copper in construction; (4) they require thirty per cent less motive power. These improvements have been achieved by the suppression of the exciting coil, the bringing of the electro-magnet into the circuit of the current, by an improved arrangement of the copper garniture of the bars of the electro-magnets, and by a slight increase in speed. The original electric light machine fed a regulator of 900 carcel burners, its weight amounted to a tun, and it occupied a space of 2 feet 4 inches square by 4 feet in hight. This machine heated itself, and gave rise to sparks between the bobbins and the conductors. The new machine is composed of a framework in cast iron, two electro-magnetic bars, and a single movable central ring, instead of six bars and three rings. Its normal power is two hundred burners.

Dogs and Books as Vehicles of Disease.

A case of scarlet fever has recently happened in England, in which the disease was communicated to two children by a dog. It is believed that the animal, which had been the constant companion of a scarlet fever patient, had had its hair impregnated with contagious matter. This suggests the possibility of dogs, cats, and other household pets transferring the malady from one house to another, and renders it advisable to keep them out of the way during prevalence of the fever. Another little considered source of disease may be books in public libraries, particularly volumes which are freely circulated and which cannot be prevented from reaching the hands of patients afflicted with contagious diseases.

A Railroad on the Ice.

A brilliant Duluth newspaper proposes a railroad on the ice from Duluth to the Sault—the whole length of Lake Superior. It would simply spike the rails to the ice, without grading, filling, excavating, ballasting, or ties. The track, it says, could be taken up every spring and stowed away. The road would be about 400 miles long, and a dead level. It claims that the ice lasts till April; is thick enough to sustain a train of cars; the freight cars could be transferred to the ice without reloading, and the rails could be spiked to the ice, or they could be fastened in a frame and laid on the ice without spikes, "which would do just as well."

If some ingenious man will provide a way to float the track when the thaw comes, the railway might be used summer and winter, with no occasion to take her up. If Duluth did not then become the capital of an empire, then locomotion would be at a discount.

Horse Clipping.

The *Evening Post* is our authority for saying that Commodore Vanderbilt's mind has been exercised about the cruel, if not actually criminal, custom of clipping the hair from valuable horses, with the idea of adding to their beauty. This veteran horse fancier, who has hardly his superior in America, remarked, in presence of several gentlemen, that he would himself willingly give a handsome premium to anyone who would compile a correct report of deaths occurring among the valuable horses in the city of New York from colds and other diseases engendered by this practice. "In fact," added the Commodore, "I thought of this matter before getting out of bed this morning, and I really don't understand how it is that Mr. Bergh has not got after these inhuman fashionables. They certainly deserve his special attention."

Sperm oil is the best for oil stones. Do not use kerosene.

[*Continued from first page.*]

The saw is mounted on a separate carriage and has its own belt. Upon one side of the blade are secured two peculiarly arranged knives, so that, when the cutting mechanism is moved up against the edge of the head by the foot treadle, both sides are cut at once; and, at the same time, through its rotating, the work is turned in circular form. The saw carriage is provided with a counterpoise to bring it back into position when the treadle is released. The machine is so constructed that, with one and the same concave saw, all kinds and sizes of heads can be made, and the turning of one hand wheel quickly sets the machine to any size required; and the saw is so presented to the wood that it runs with the same freedom and smoothness, and requires no more power or set than an ordinary circular saw of the same diameter; and its work is done with great celerity and excellent finish. The machine has also an attachment which gives the heads an oval form, to compensate for the shrinkage of material. The attachment can be used or not, as desired; if not used, the heads will be perfectly round. This completes the operation of making the heads, which are then transported to the proper place and inserted in the barrels.

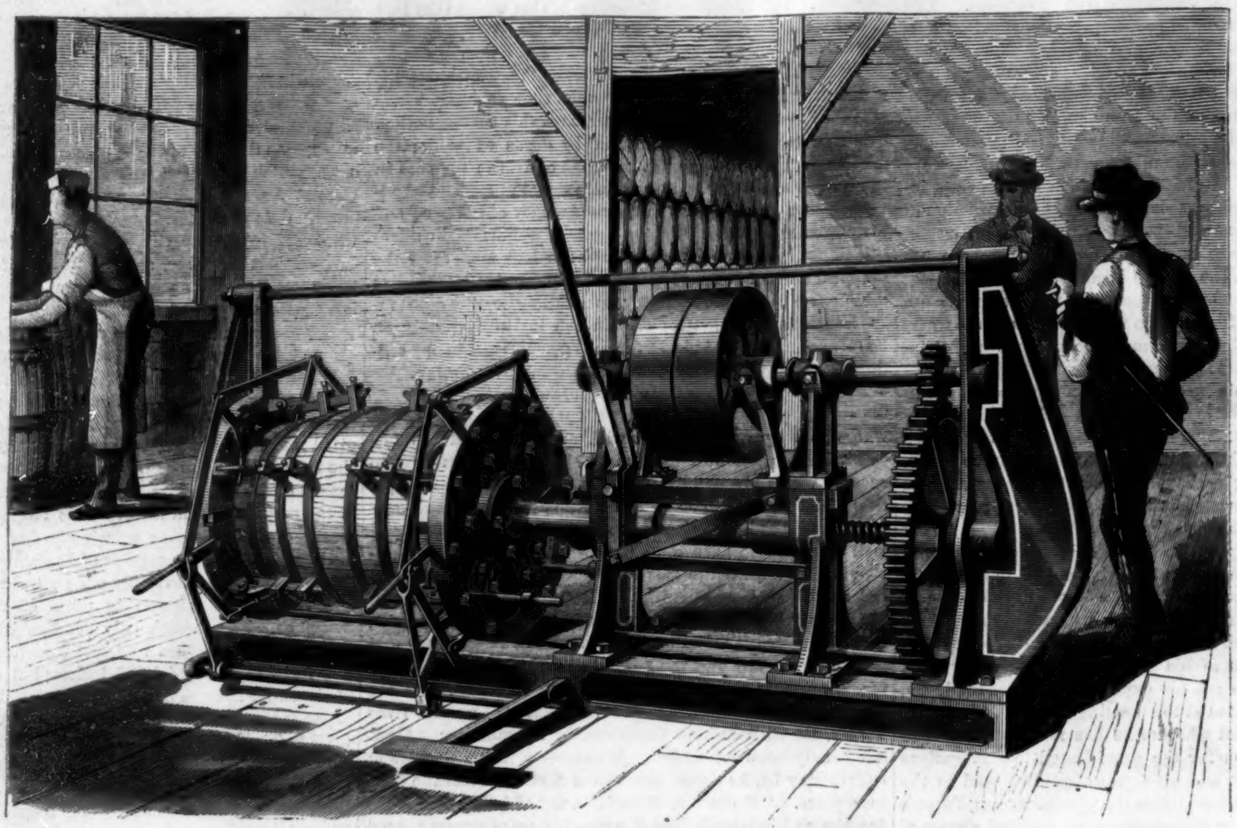


Fig. 4.—BARREL LEVELING, TRUSSING, AND HOOPING MACHINE.

The next machine, to which we shall now call attention, serves to level the barrels and also to truss them. This, in our previous description, we explained as done by two separate devices, the first by a machine which compressed the barrel endwise between two disks, and the other by iron hooks and projections coming up through the floor, which, engaging with the truss hoops, forced them into place.

In the apparatus represented in Fig. 4, the devices are all connected with the leveling disks, and, by means of handles on each of the latter, are all opened at once. The barrel with the truss hoops on is then inserted, and a pressure of the foot treadle closes all simultaneously. By means of the clutch lever the machine is then thrown into action The pulley shaft actuates (through gearing) a screw shaft, which forces the movable disk toward the stationary one, thus, through the drivers, pushing the truss hoops to their proper places on the barrel, and, at the same time, leveling the ends of the same. This machine, we are informed, will truss and level 2,000 flour, sugar, cement, or any other kind of slack barrels, of various sizes, per day.

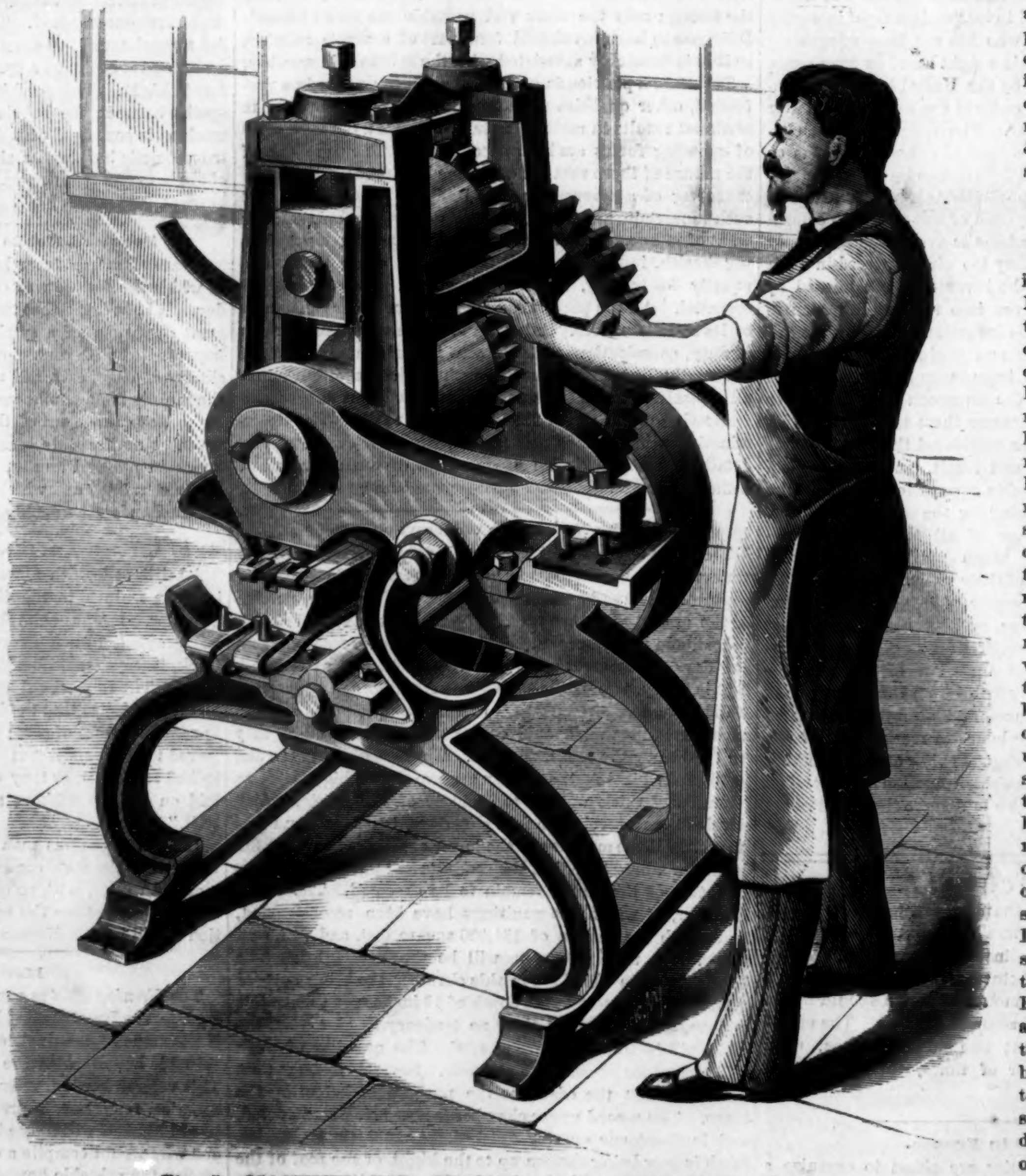


Fig. 5.—MACHINE FOR BENDING THE BARREL HOOPS.

Fig. 5 represents the device used for bending and giving to metal hoops the requisite flare, and also for riveting the ends together. The bending and flaring is done by passing the hoop through the rolls shown, which are adjusted by set screws from above. The mode of doing this is clearly represented in the illustration. The ends are pierced by placing them under the punches arranged at the end of a lever actuated by an eccentric cam on the spindle of the lower roll. This done, the ends of the hoop are brought together, and the holes in each made to coincide by placing them over the two projections at the side of the lower portion of the apparatus. The hoop is then raised and the apertures slipped over the rivets, which are previously placed in the U shaped holders, just above the part last described. The side lever below the cam slot is square, and two lugs are formed thereon. Under these the hoop, with the rivets now inserted through its holes, is pushed; and in their descent the lugs strike the rivets and close them, completing the operation and leaving the hoop ready for placing upon the barrel.

We need hardly point out to our readers the remarkable ingenuity and inventive skill displayed in all of the above machines. They are, without doubt, destined literally to revolutionize the entire cooper's trade, since they are the first complete set of substitutes for hand labor in that difficult calling. As we remarked in a previous article, this machinery has been the inciting cause of serious strikes among the coopers. These uprisings, however, like all similar movements based upon the mistaken ideas which regard the continuance of trade monopolies as of more importance than the benefit to be gained by the public through inventive progress, have proved far more damaging to their originators than to those whom they were intended to coerce.

We are indebted to Mr. L. M. Palmer: at whose establishment, in Brooklyn, E.D., the immense number of barrels required by several great sugar firms are manufactured, some 5,500 per day: for the necessary facilities in obtaining the above interesting facts. The machines were invented and are manufactured by Messrs. E. & B. Holmes, of 59 Chicago street, Buffalo, N. Y.

Reproduction of Old Thoughts.

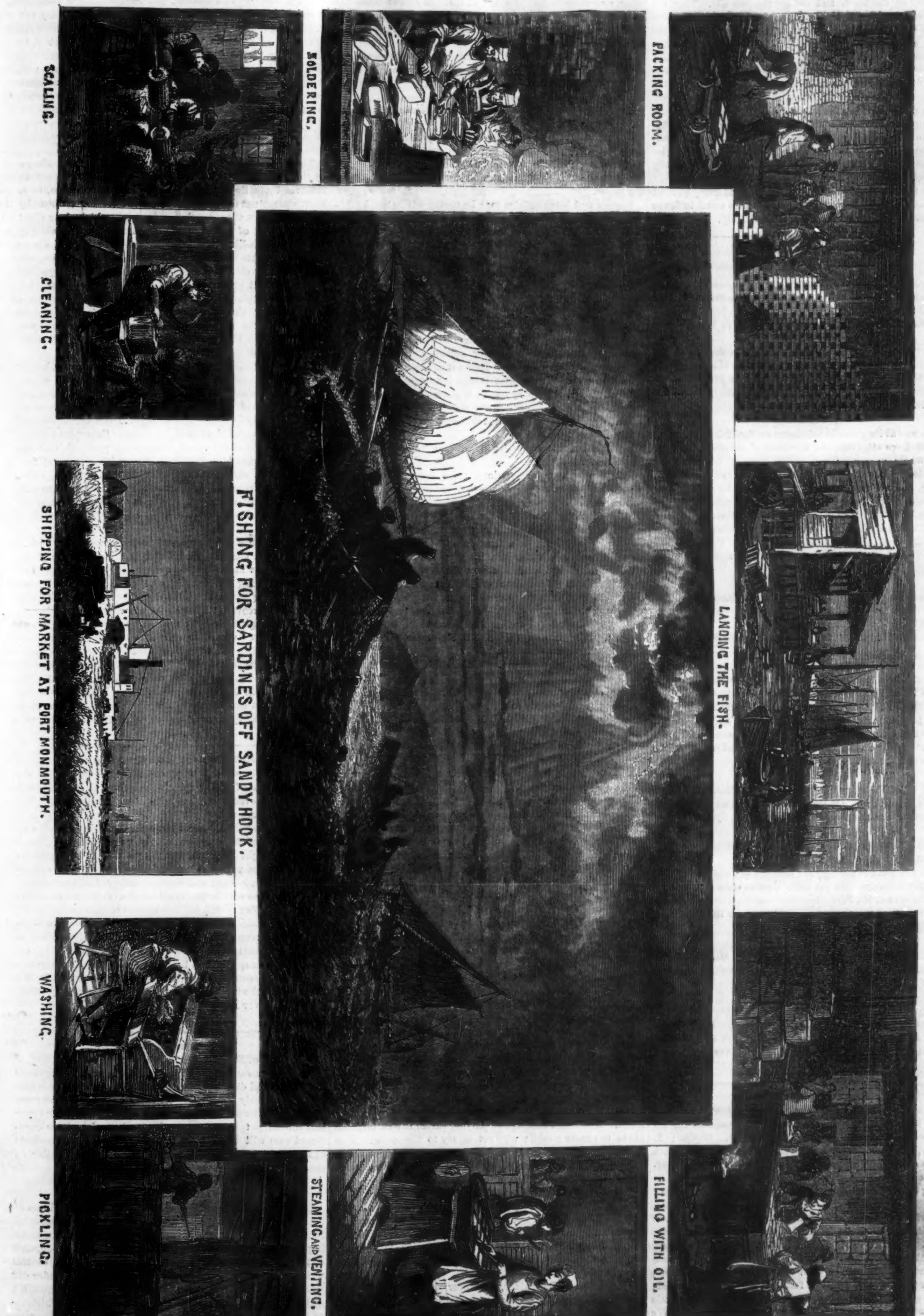
On the above theme, a writer in *Blackwood* thus discourses: Nothing is more strange than the incessant reproduction of old thoughts under the guise of new and advanced opinions. It would seem as if the human mind, with all its restless activity, were destined to revolve in an endless circle. Its progress is marked by many changes and discoveries; it sees and understands far more clearly the facts that lie along the line of its route, and the modes or laws under which these facts occur; but this route in its higher levels always returns upon itself. Nature and all its secrets become better known, and the powers of Nature are brought more under human control; but the sources of Nature and life and thought—all the ultimate problems of being—never become more clearly intelligible. Not only so, but the last efforts of human reasoning on these subjects are even as the first. Differing in form, and even sometimes not greatly in form, they are in substance the same Bold as the course of scientific adventure has seemed for a time, it ends very much as it began; and men of the nineteenth century look over the same abysses of speculation as did their forefathers thousands of years before. No philosophy of theism can be said to have advanced beyond the book of Job; and Professor Tyndall, addressing the world from the throne of modern science—which the chair of the British Association ought to be—repeats the thoughts of Democritus and Epicurus as the last guesses of the modern scientific mind.

Clean files by holding them in a jet of high pressure steam

THE SARDINE INDUSTRY.

The purity and delicacy of the little fish which haunts the Bay of Biscay and the Mediterranean is known everywhere, tas excellent keeping qualities, when preserved in oil, enabling it to be transported for an indefinite distance. It has much in common with the sprat in flavor, but also reminds the epicure of the anchovy, which, we believe, is peculiar to the Mediterranean and other coasts of France. It is a member of the herring family, as is also the anchovy; and, like all the species, is generally found in shoals. The sardine is identical with the pilchard, caught in such immense numbers on the southwestern coasts of England; but the latter is the mature fish, while the smaller fry are largely preyed upon by cannibal foes, especially the cod and the sturgeon.

A very excellent substitute for the sardine, however, is the menhaden, or mossbunker, which, in the spring and fall, is found in great numbers along our coasts. It is slightly spotted on the back, and is sometimes called the ocean trout. The objection to these fish, for general use, is that they are very bony. The American Sardine Company, says *Harpers' Weekly*, from which we select the engraving, by a mechani-



FISHING FOR SARDINES OFF SANDY HOOK.

cal process known only by themselves, have removed this objection.

Our illustrations show the several processes through which the fish are passed after being taken. They are first brought to the scaler, which consists of a long shaft, on which are twelve wheels filled with long blunt teeth, which revolve very rapidly, and take off every scale in an incredibly short space of time. From the scalers they are passed to hands who chop off the heads and cut out the entrails. They are then placed in the washing troughs, above which are a number of revolving circular brushes, by contact with which the insides are thoroughly cleaned. They are then placed in pickle vats, where they remain for a few hours, until they are sufficiently salted; after which they are spread upon large tables, where they are placed in the cooking cans. They are then taken to the steaming tanks, of which there are seven, each having a capacity for holding 1,000 boxes. From the steaming cans, they are again taken to the tables and transferred to the permanent cans, when they are oiled and spiced, and then handed over to the tinsmiths to be soldered. The time from the fish being brought to the factory until they are boxed and labeled, is three days.

These fish are shipped in large quantities to every part of the country, and by many are considered quite equal in flavor to the sardines imported from France and Italy.

ASTRONOMICAL NOTES.

OBSERVATORY OF VASSAR COLLEGE.

For the computations of the following notes (which are approximate only) and for most of the observations, I am indebted to students. M.M.

Positions of Planets for February, 1875.

Mercury.

Mercury is at its greatest elongation from the sun on the 13th of February, when it sets at 6h. 10m. P. M., and should be seen in the twilight, north of the point at which the sun disappeared. On the 28th of February, Mercury sets at 6h. 3m. P M.

Venus.

Venus was at its greatest brilliancy on the 12th of January, and must have attracted the attention of all observers during the whole month. Its meridian passage being near 9 A. M., it could be followed with the naked eye during the morning, and for some time after it passed the south point. Its crescent shape could be seen with a small telescope.

On the 1st of February, Venus rises at 4h. 13m. A. M., and sets at 1h. 48m. P. M. On the 28th of February, Venus rises at 4h. 18m. A. M., and sets at 1h. 54m. P. M. If its motion is watched among the stars, it will be seen to be moving rapidly toward the east.

Mars.

Mars is coming into a better position as to time of meridian passage, but is lower and lower in the south. It rises at 1h. 50m. A. M., of the 1st, and sets at 11h. 36m. A. M. On the 28th it rises at 1h. 16m. A. M., and sets at 10h. 36m. A. M.

Jupiter.

We are coming into better position relatively to Jupiter, but it is still best seen in the early morning hours.

On the 1st of February, Jupiter rises at 11h. 49m. P. M., and sets at 10h. 31m. the next morning. On the 28th, Jupiter rises at 10h. 3m. P. M., and sets at 8h. 45m. A. M. the next day. Early in the month Jupiter is directly south near 5 A. M., in the middle of the month at 4 A. M., and near 3 A. M. at the last of the month.

Saturn.

On the 1st of February, Saturn rises at 7h. 32m. A. M., and sets at 5h. 26m. P. M. On the 28th, Saturn rises at 5h. 56m. A. M., and sets at 3h. 58m. P. M.

Uranus.

Uranus is in a good position, as it comes to meridian at midnight and at a high altitude.

On the 1st, Uranus rises at 5h. 10m. P. M., and sets at 7h. 20m. in the morning. On the 28th, Uranus rises at 3h. 18m. P. M., and sets at 5h. 32m. the next morning. An ordinary telescope will show the disk of Uranus, so that it can be known from a star.

Neptune.

Neptune rises on the 1st at 10h. 27m. A. M., and sets at 11h. 33m. P. M. On the 28th Neptune rises at 8h. 42m. A.M., and sets at 9h. 50m. P. M.

Sun Spots.

Photographing has been interrupted since the last report by the holidays, and later by clouds and wind. From January 7 to January 16, the sun was observed with a small telescope nearly every day, and the spots were very few and small.

How to Grow Lean.

From a quotation in the London *Medical Record*, we learn that M. Philbert states that the principal measures for reducing obesity come under four heads:—1. *Régime*; 2. Hygiene; 3. Exercise and Gymnastics; 4. Waters with sulphate of soda. The basis of the *régime* rests on the prevention of the introduction of carbon into the system, or on favoring its transformation, and augmenting the amount of oxygen. The food must, therefore, be non-nitrogenous, varied with a few vegetables containing no starch, and some raw fruit. But the temperament of the patient must be kept in view. The lymphatic should have a red diet, beef, mutton, venison, hare, pheasant, partridge, etc., and the sanguine should have a white diet, veal, fowl, pigeons, oysters, etc. Vegetables, not sweet or farinaceous, may be allowed; grapes, gooseberries, apples, etc. *Café noir*, tea with little sugar and the addition of a little cognac, may be used. We must forbid sugar, butter, cheese, potatoes, pastry, rice, beans, peas, etc.

The hygiene consists in favoring the action of the skin, in wearing a tight roller to support the walls of the abdomen, in taking plenty of exercise on foot or on horseback, playing at billiards, fencing, swimming, gymnastics, etc.

The Banting treatment is not very different. It consists in abstaining from bread, butter, milk, beer, potatoes, pudding, and from sugar in every shape. It allows some biscuit or dry bread, every kind of fish except salmon, and every kind of meat except pork, all vegetables except potatoes.

Purgatives have a good deal to do with the success of treatment of cases of obesity, and some have thought scammony as effective as sulphate of soda.

Useful Recipes for the Shop, the Household, and the Farm.

Water containing lime compounds—very common in country wells—may be rendered fit for use, for many purposes in the arts, by the addition of a little chloride of ammonium.

Glycerin added to paper stock increases the flexibility of the paper.

Copper and brass articles may be coated with zinc, by dipping them into a boiling concentrated solution of sal ammoniac containing finely divided zinc.

Platinum bronze, said to be entirely unoxidizable and especially adapted to the manufacture of cooking utensils, is made of nickel 100 parts; tin 10: platinum 1.

A mixture of 358 parts phosphate of soda and 124 parts boracic acid is mentioned as another good copper-welding compound.

Pure glycerin may be tested as follows: When treated slowly with sulphuric acid, it should not turn brown; with nitric acid and nitrate of silver, it should not become cloudy; and when rubbed between the fingers it does not emit a fatty smell.

Silicate of soda (water glass) stops fermentation.

Adulteration of soap by starch is shown by dissolving the soap in alcohol, which leaves the starch behind.

Anhydrous phosphoric acid is the most perfect known substance for drying gases.

Never allow drinking water to be drawn from a cistern supplying a water closet.

Extend pipes from water closet traps or one (larger) from the main waste pipe into the nearest chimneys. The pestilent gases will thus be carried off, instead of being allowed to escape into the house.

To make artificial veneer, soak the wood for 24 hours and boil for half an hour in a ten per cent solution of caustic soda. Then wash out the alkali, when the wood will be elastic, leather-like, and ready to absorb the desired color. After immersion in the color bath, dry between sheets of paper under sufficient pressure to preserve the shape.

Dry furnace heat, productive of throat and lung diseases, may be moistened by hanging a wet towel in front of the register, the lower edge of the towel being allowed to dip in a shallow vessel of water.

After taking up a carpet, sprinkle the floor with very dilute carbolic acid, before sweeping.

Avoid wearing heavy overcoats or furs for hours in succession; the tendency is to weaken the powers of resistance of the wearer leaving him liable to inflammation of the throat and lungs.

To cut india rubber, dip the knife blade in a solution of caustic potash.

A wall of soft burned bricks built up within a cistern makes an excellent filter.

Never store any articles of food or drink in old petroleum barrels. They are poisonous even after being cleaned.

To mold figures in paste, take the crumb of a new drawn white loaf, mold in a mass until the whole becomes as close as wax and very pliable. Then heat and roll with a rolling pin. Mold it to the required shape, and dry in a stove.

Frozen potatoes can be cured by soaking in water three days before cooking.

In drilling wrought iron, use one pound of soft soap mixed with a gallon of boiling water. This is a cheap lubricator, and insures clean cutting by the drill.

To cure scratches on horses, wash the legs with warm strong soap suds and then with beef brine.

To remove paint splashed upon window panes, use a hot solution of soda and soft flannel.

Frosted feet may be relieved of soreness by bathing in a weak solution of alum.

Never use glazed earthenware pipes for upward flues.

Effects of Copper and Brass on the Color of Vermilion.

It has often been observed that, when vermilion inks are employed for printing from copper plates or copper-faced types and electrotypes, the color changed to a dirty brown or black. In the manufacture of playing cards, it was impossible to use brass stencils without injury to the color. Karmarsch has been studying this subject for a number of years, and some of his experiments and results, having been made public, have been repeated by Heumann.

Karmarsch at once recognized the fact that the change of color was due to the formation of sulphide of copper, but he supposed that the sulphur necessary to produce this came from impurities in the vermilion. For, said he, it is highly improbable that the vermilion is decomposed at ordinary temperatures, and the text books in chemistry point to no such facts.

Heumann, of Darmstadt, however, has recently proved that this highly improbable decomposition does nevertheless take place. Karmarsch's proposition to boil the vermilion in a solution of purified potash seemed to Heumann rather useless, still he followed his plan. He took very pure vermilion, perfectly free from metallic mercury, which did not discolor the potash solution when boiled in it, nor could a trace of sulphur be detected in it. Nevertheless, when a strip of bright copper or brass foil was placed in it, it immediately became covered with a film of black sulphide of copper. When the vermilion, that had been boiled three times in fresh potash lye and washed, was rubbed on the strips of metal with a cork, they were blackened. Perfectly dry vermilion requires to be rubbed with some pressure; but when stirred up with a little water, it suffices to merely rub it on the metal with the finger. When rubbed quite hard with the cork, a part of the film separates from the metal, and, mixing with the vermilion, imparts to it an almost black color; while the copper, at the point where it was in contact with the vermilion, looks as if it had been amalgamated. It is even possible to write on copper and brass with a piece of sublimed vermilion; and after rinsing with hydrochloric acid, the writing appears in silver-colored characters.

The ease with which vermilion is decomposed is shown by this experiment, and, of course, that property cannot be removed by boiling with potash solution. Karmarsch, however, states that there are two ways of freeing commercial vermilion from those sulphur compounds which alone effect the formation of sulphide of copper: First, that already mentioned of boiling in potash, and second, mixing the vermilion to a paste with water, and putting in strips of copper, which take up all the free sulphur, and take away from the vermilion that property of blackening copper. This result can only be explained on the supposition that the vermilion employed for the experiment actually contained sulphur which could be removed, and by which the copper was changed, while the vermilion itself was not in sufficiently intimate contact to suffer decomposition.

Heumann, following Karmarsch's example, placed a bright copper coin for some time in a paste of vermilion and water, and found on rinsing the coin off that the metal had remained almost unaltered. Only on those spots which had accidentally been rubbed with a glass rod, used to stir up the precipitate, was the metal blackened. Wherever the copper coin lay against the side of the vessel beneath the paste, so that the metal came more intimately in contact with the vermilion, amalgamation and blackening took place at once.

The results obtained by Karmarsch are, according to this, only possible when the copper coin lay perfectly quiet in the pigment, and so was able to take up only the free or dissolved sulphur.

Since in printing with vermilion, or in rolling or brushing it through stencils, the contact is sufficiently intimate, in many places at least, to decompose the pigment, it is evident that boiling the vermilion in potash solution cannot prevent the injury to its color, although this may perhaps be reduced. Moreover, when rubbed up with oil, the pigment is not so strongly attacked as when dry or wet with water. Iron decomposes vermilion only at a high temperature, and hence may be rubbed with it without injury to the color. Zinc only decomposes it slightly when rubbed with the wet color; and as the sulphide of zinc produced is white, the change of shade is scarcely perceptible. Nickel, too, we believe, does not act upon vermilion, and hence the advantage of nickel-faced type over copper-faced for use with vermilion ink.

British Telegraphic Progress in 1874.

The most important telegraphic improvements in the British system of Telegraphy, consist in the extended use of American inventions, that have been employed here for years. For example, *Engineering* says:

An important change has been effected during the year by the more complete adoption of the "Sounder." This is a step in the right direction, and the "Sounder" will eventually become the principal instrument in use by the department. Its introduction will be slow and gradual, but unquestionably its use will be found attended with the greatest success. The Duplex system has been found to answer admirably, and where business had increased to such an extent as to require extra accommodation, it has been at once introduced to the improvement of the working. On short circuits the ordinary Duplex system has been used, but in longer circuits the system known as "Stearns'" has been adopted. At the present time the total mileage of wire working on the Duplex principle is over 12,000 miles, the largest circuit being 450 miles.

A Large Prize.

The King of Belgium has established an annual prize of $5,000 to be awarded for the best works or investigations upon certained determined subjects. The competition is confined exclusively to Belgians, except in every fourth year, when the citizens of any nation may compete. The first general concourse takes place in 1881, when the above mentioned sum will be awarded for the best work on methods of improving harbors on low and sandy coasts, similar to those of Belgium.

Gas Dangers.

Too much care cannot be exercised in seeing that leaks do not exist in the gas pipes or that burners in unoccupied rooms are not left partially turned on. Ordinary illuminating gas, when mixed in certain proportion with air, forms a dangerous explosive mixture, liable to blow up on contact with flame. A fearful explosion occurred almost under our windows recently, and three people were injured, through a girl entering, with a lighted lamp, an apartment which received the escape from a leak in the gas main.

Recent American and Foreign Patents.

Improved Vibrating Propeller.

Charles P. Macowitzky, Corpus Christi, Tex.—This invention is an improvement on the propellers for which the same inventor obtained previous letters patent, and it relates to the arrangement of the sliding frame, to which the paddles are pivoted, with relation to the side or shell of the boat or other vessel, and to the rack bar by which the paddles are vibrated. By reversing the paddles upon one side, the vessel may be turned in a very small space—almost upon her axis. A vessel with this system of propulsion will be enabled to avail herself of winds, and go under sail entirely, if so desired.

Improved Wheel Plow.

William Dickie, Gillespie, Ill.—This invention is a wheel plow in which novel devices are provided to allow of its being easily raised from and lowered to the ground, adjusted to work at any desired depth in the ground, and to run level whatever may be the depth of the furrow being plowed, and when both wheels are running upon the unplowed land.

Improved Cooking Stove.

Edwin O. Brinckerhoff, New York city.—In this stove, by suitable arrangements of flues and dampers, the products of combustion are caused to pass over the top, back, bottom, front, and sides of the oven, so that the said oven will be heated evenly and thoroughly with the least possible amount of fuel.

Improved Car Coupling.

Charles Surplice, Ludington, Mich.—Levers are provided by means of which the drawheads are moved laterally, and there are scroll springs at the back ends of the drawheads, which give them flexibility. The drawheads are allowed to rise by means of wedge-shaped keys, which are operated by levers. The other ends of these levers work beneath the horizontal bars and on horizontal levers, and are so held in any position. The keys work under angular plates which limit the lateral movement of the drawhead. Arms on the ends of shafts raise the hooks by levers at the front ends of the coupling. The coupling bar is made to engage with the hooks. This coupling bar is retained in a horizontal position by the shape of the cavity in the drawhead and the form of the hook, so that the cars will couple automatically when they come together.

Improved Wood Sawing Machine.

Henry Filley and Alanson D. Wood, Hersey, Mich.—By an ingenious application of cams, arranged alternately with reversed curves on the driving pulley, two double motions of the saw are made to one revolution of the driving pulley. The cross head is connected to an endless rope, which passes over pulleys and is connected to a hand lever, which is used to raise and lower the saw by moving the cord up and down. This lever is also used to press the saw into the work, and is provided with a cord and weight for applying the pressure.

Improved Vibrating Propeller.

Clement Theobald, Elliston Station, Ky.—This is a submerged incased propeller, consisting of reciprocating bars arranged under the water on each side of boat, and provided with a series of short hinged side paddles. The forward stroke of the slide boards throws the paddles sideways along the boat, and on cushioning springs, so as to offer hardly a resistance to the water, while the return stroke throws them on the braces into position for producing the propulsion of the boat.

Improved Auger.

Charles F. King, Covington, Pa.—This auger has a detachable cutter head, which may be readily replaced when injured, and which allows the use of the auger with cutters of various sizes. The detachable cutter head is placed over the screw point, and connected by grooves with dovetailed side recesses, fastening the screws to the lips of the auger.

Improved Automatic Pumping Engine.

Hiram S. Maxim, New York city.—The construction of the fire chamber is such as to leave a thin stratum of water all around the sides, so that the formation of steam will begin very soon after the fire has been started. The fire pot is made in the shape of a short tube open at both ends, and in its lower part is placed the perforated burner, which is secured to the end of a supply pipe, through which the combustible is introduced. When the pressure in the boiler increases, a diaphragm is raised against the weight of a block, and the force of a spring closes a valve more or less, according to the amount of pressure in the boiler and vessel. A small hole is drilled through the valve to enable enough of the combustible to always pass through to support a small flame, and thus prevent the flame from being extinguished by the closing of the valve, so that, as the valve again opens upon the diminution of the pressure, the flame will immediately increase, the formation of steam being thus increased and diminished automatically. With the steam pipe is connected a four-way casting, with the inlet and outlet arms of which are connected the parts of the said steam pipe. With the upper arm of the casting is connected a safety valve. With the fourth arm of the casting is connected the throttle valve. The pump is attached to the frame work upon the side opposite to the engine, is single-acting, and the water escapes from it through the valve chamber into the four-way casting, with one arm of which the discharge pipe is connected. Other ingenious devices are provided to ensure constant oiling and a steady flow of water, and to regulate the feed.

Improved Railway Switch.

Samuel T. Dutton, Worcester, England.—This invention provides a means for rigidly securing the facing points of switches, to prevent the possibility of the points being fouled by the opening of both tongues at one time. The switches are made from twenty to twenty-two feet in length, and are connected and moved separately, in such manner that only one tongue can be moved at a time. The switch is connected to the single rod by cranks at two or more places in its length, thereby holding the switch firmly and equally against the stock rail at different points. To secure the facing tongue close up to the rail, at the point of each tongue is placed a cam, moving on a stud on the point chair, each cam being connected to and moved by the opposite switch. It follows that, when either of the switch tongues is opened, it will cause the other tongue, which then becomes the facing switch, to be secured in its place, and, as the open or free switch cannot be closed while a train is passing or standing in them, the facing switch thereby remains secured.

Improved Well Drilling Machine.

John E. B. Morgan and Henry Kelly, Osage, Iowa.—The mast over which the rope for working the drill rod goes can be readily folded down on the frame, for convenience in storing and moving. Devices are provided, so contrived that the rope can be let out at any time, as the drill descends, without stopping the machine. Whenever it is required to raise the drill rod out of the well for pumping it out, the power employed for working it may be employed therefor merely by throwing in the clutch; and when the clutch is thrown in gear, the stop lever arrests the drill-operating lever and holds it, so that the drill ceases working while being raised.

Improved Combined Roller and Harrow.

William W. Anderson, Wartrace, Tenn.—When the machine is drawn forward, cutters cut in pieces stalks and weeds and cultivate the wheat, while rollers will roll it, leaving the ground smooth for the harvester. When only a roller is required, the machine is turned, so that only the rollers will touch the ground.

Improved Lawn Mower.

Leonard G. Youngs, Morris, Ill., assignor to himself and Richard Hughes, same place.—This invention relates particularly to the construction of the axle and ratchet lever for vertically adjusting the frame and hand guide bar of the machine, and also to the connection of the finger bar with the frame, to adapt the former to be raised entirely off the ground when the machine is to be moved from one point or place to another.

Improved Railway Axle Boxes.

C. A. Hussey, New York city.—The first invention is designed to prevent the entrance of dust and sand into the axle boxes of railroad trucks, and thereby prevent the heating and wearing of the journals and brasses over them. This is accomplished by means of leather packing, arranged to form a tight connection from the box against the wheel, so that the lubricating fluid may be poured into the box, to allow the journal to run in oil. The invention does away with the old dust plate and the cotton waste packed in beneath the journal. The axle box is made shorter, smaller, and consequently lighter and cheaper than the common box, while it accomplishes the object in the most perfect manner, that is, the complete lubrication of the journal and its consequent protection from heating and wearing. Mr. Hussey has also another invention, which is an improved method of preserving the journals and brasses of railroad axle bearings from heating and wearing. This is accomplished by producing a circulation of water or other liquid through the brass or box, which receives all the friction of the journal. The brass of the axle is chambered out in any suitable manner, and elastic tubes are connected therewith for conducting and discharging the water to and from the brass. A lively current of water is produced from an elevated reservoir, which keeps the brass and journal at a low temperature. The ordinary absorbent (cotton waste) may be used in axle boxes having this cooling current applied to the brasses with safety from heating and wearing. Both inventions have been patented through the Scientific American Patent Agency in Canada, England, and most of the countries on the continent, and one of our leading railroads is about to adopt one or both improvements in their cars.

Improved Drawbar and Buffer.

Charles Billmeyer, York, Pa.—This invention relates to novel means for reinforcing and sustaining the ordinary transverse car springs to which the drawbars are attached, and consists in combining three springs with the same beam, bolt, and nut.

Improved Gin Saw Sharpener.

Josiah Mizell and John Revell, Colerain, N. C.—This invention relates to machines for sharpening the teeth of a series of saws arranged upon the same shaft, the object being to direct the feed of the rotary file from one tooth to another while the same sharpener is thus adapted to saws of different diameter, and the saw that is being sharpened is steadily centered between the legs.

Improved Vapor Bath.

John Becker and William D. Hoffman, Sigourney, Iowa.—This invention relates to a mode of using electricity as a vehicle, in connection with steam, for the introduction of medical remedies through the pores of the skin. The invention consists in arranging the evaporation pan in such a way as to afford a general or special delivery of the vapor; in the use of doubly adjustable electrodes, and in providing the bath closet with a tube that has an internal conductor and binding screw.

Improved Gas Cooking Apparatus.

Thomas Peacock, of Wood Green, and John C. Peacock, of Finsbury Park Road, England.—This is a simple arrangement of metallic casings, in which the air necessary to support combustion, after passing through holes in the internal casing of the door, is conveyed to gas jets, and the heated products circulate all around the oven, and finally make their exit, cooling as they descend, through holes into the flue to the chimney. The back of the apparatus is formed with a double casing, with intermediate space forming the flue. The gas jets in the door are enclosed in a small separate case, which is open at the top.

Improved Cart Brake.

Justus B. Mead, Jr., Darien, Conn.—This invention consists of brakes for the wheels of a two-wheeled vehicle, arranged on the box independently of the shafts, so that they will turn around with the wheels and be utilized for tilting the box when the cart is backing up to the place to dump. The invention also consists of the brakes pivoted to the sides of the box, one to each wheel, and connected in a peculiar manner to one lever, whereby both may be operated by it.

Improved Extension Ladder and Fire Escape.

Abraham Oberndorf, Jr., and Ernest Frank, Baltimore, Md.—This invention relates to certain improvements in fire escapes, and it consists in the combination of friction wheels, ratchet tramways, and guide blocks, with the four corner posts of separate and independent stories, which slide into each other after the manner of a telescope. It also consists in the combination of horizontal swinging bars and vertical rods, with detents which fit in the ratchet teeth and support the stories, for the purpose of affording means for operating the stories. The invention also further consists in the combination with hoisting pulleys of a windlass consisting of separate and independent barrels, corresponding in number to the number of the movable stories, which rest upon a core or shaft, or revolve with the same by means of a clutch wheel and spline, as may be desired.

Improved Hay and Cotton Press.

William C. Banks, Como, Miss.—This invention relates to certain improvements in cotton presses, and it consists in the peculiar construction and arrangement of the devices for adjusting the follower block and its pivoted supporting bar in its position to one side of the box, for the purpose of obviating the obstruction usually afforded by the same when the box is being filled. It also consists in the peculiar form of the box, which has increasing transverse dimensions as it tapers from the mouth to the place where the bale is compressed.

Improved Safety Catch for Elevating Carriages.

Henry Opperman and Alexander Black, Steubenville, Ohio.—This invention relates to the cages in which men and materials are transferred to and from the inside of a mine, the object being to provide a safety attachment by which danger from the breakage of a rope or other part of the holding device will be surely and effectually prevented.

Improved Sight Protector.

M. H. Mendenhall, Wabash, Ind.—The object of this invention is to provide an improved device for use in reading by the aid of artificial light. The same consists in a lamp-containing box, or case, cut away at one side and provided with a pivoted or hinged plate for deflecting the light, the latter being adjustable and adapted to be clamped or secured at various angles. The rays of light may be concentrated and practically increased in power; or their amount and direction may be varied at will, by changing the position of the pivoted deflector. The eyes of the reader are at the same time protected from light and heat. The device is adapted for general use, and particularly with sewing machines.

Improved Shingle-Dressing Machine.

Samuel M. King, Lancaster, Pa.—This invention consists in novel and very effectual means whereby both sides of a shingle may be planed and faced smooth by a single operation, thus greatly lessening the cost of manufacturing the article.

Improved Wash Stand.

William Schwars, New York city.—This wash stand has a lid to which is hinged a looking glass. There is also a water receptacle and basin, a blacking stand, which may be drawn out at will, and a convenient drawer. The whole, when closed up, presents the appearance of a bureau.

Improved Sail for Vessels.

James C. Nichols, New York city.—This invention consists in combining, with the gaff of a fore-and-aft sail, an independent sail, connected with the mast by means of a jackstay and rings, and adapted to be furled to the gaff.

Improved Engine for Rock Drills.

James Brandon and Albert W. Trankle, New York city.—Steam passages connect each end of the cylinder with the steam chest, and enable the piston to be reciprocated. This piston has annular grooves connected by longitudinal grooves. The channel ways thus formed between these heads connect with channels and with the live steam chamber. There is, in consequence of this relative construction, an equilibrium of steam pressure always maintained on both sides of the pistons, except just before the heads reach the limit of their throw. The steam is momentarily cut off and serves to reverse the position of the pistons and the valve.

Improved Alarm Combination Lock.

Henry W. Dilg, Portland, Oregon, assignor to himself and William Zimmerman, same place.—In this lock, the tumblers are provided with false and true slots, which are not radial to the center, but in line with a prolongation of the pins or tongues of the main bolt. A spring hammer with alarm bell is connected with the tumbler wheel, and set by a stud, in connection with alarm tumblers, so that any attempt at opening the lock without setting them to their combination will be indicated by the continued ringing of the bell.

Improved Medicated Bath Apparatus.

Jean Joseph Louis Brémond and Paul Alexis Ernest Brémond, Paris, France.—The object of this invention is to provide a means for the cutaneous application of medicines for the purpose of healing diseases. It consists in an airtight chamber, provided with means of ingress and egress, and having a hole through the top, through which the patient's head protrudes, the said chamber being lined with such material as is not likely to be affected by the corrosive action of the medicines. At one end of the chamber, near the top, is an enclosed place, provided with sliding doors, in which rests a vessel containing the medicated solution, and in the bottom of said vessel rests one leg of a glass siphon, about one sixteenth of an inch in diameter. The other leg passes down the inside of the chamber, and communicates inside with a funnel-shaped mouth, at right angles with a steam pipe, after the manner of an atomizer.

[Improved Clevis.

Leander Ellsworth Smith, Dixon, Ill., assignor to Theron Cumins, Henry T. Noble, and Orris B. Dodge, of same place.—This is a simple double hook and cast stud which serves to brace the plow clevis and to allow of its speedy lateral adjustment.

Improved Locking Latch.

Henry Rogers, Eureka, Cal., assignor of one half his right to Hiram Allen Haskins.—The novel feature in this lock is that the simple throwing over of an eccentric from one side to the other releases or locks the main bolt, which is still farther secured, without any possibility of being tampered with from the outside, by a knob bolt, which slides in a slot of the inner face plate, and enters a recess of the eccentric, when the same is thrown into position for locking the main bolt.

Improved Table Hinge.

Andrew Grimm, Union Hill, N. J.—This is a novel combination, with a table having a hinged leaf, of a hinge having its pintle directly under the leaf joint. One wing is screwed to the leaf, while the other is formed in the shape of a slide piece, which moves in a recessed casing screwed to the table. This is acted on by chambered springs of a suitable strength, while the leaf is rested on a projecting shoulder of the casing.

Improved Wagon Spring Seat.

John Griffith, Bellefonte, Pa.—This consists in the attachment of strong supporting standards to the sides of the wagon, and the connection of the standards by a pivoted clip with torsionally acting springs that are securely applied to the seat by central and side socket clamps.

Improved Stop Valve.

John Demarest, Mott Haven, N. Y., assignor to the J. L. Mott iron works of New York city.—This is a combination of annularly-grooved valve and pipe, the former having a large upper and a comparatively small lower flange, while the latter has an enlargement or seat with a packing ring. By this relative construction of pipe and valve the ring is carried down by the piston, so that it remains between the valve body and the pipe, making a perfectly watertight joint. When, however, the piston is withdrawn, the lower flange raises this packing ring, and allows it to clasp the body of valve.

Improved Car Ventilator.

Franklin N. Clark, Wellington, Ohio.—This ventilator is attached to a plate of metal which is fitted into the window, and inside the latter supports a water reservoir. An expansible air receiver is placed outside the window. The reservoir receives the air from the air receiver tube, and discharges the same by an inside pipe, the latter having an annular funnel-shaped orifice. The effect is to purify the air admitted.

Improved Tongue Ring for Neck Yokes.

Seth D. Bingham, Maumee City, Ohio.—The invention consists in a tongue ring for neck yokes formed of the leather covers and a metal plate. The upper ends of the plate and of one part of the cover are left free to be passed around the neck yoke and to be secured by rivets. By this construction the rings may be made and applied to any neck yoke.

Improved Plow.

Chauncey M. Van Every, Bronson, Mich.—There is a horizontal plate on the top of the plow standard, and a plate attached to the beam. The latter plate has dowel pins to hold it strongly against being turned horizontally on the beam, and it has near one end a concave and under-cut flange with vertical notches, in which corresponding points on the end of the standard plate fit. The beam plate is rounded and fitted in a concave and under-cut shoulder of the standard plate, all so that, when both plates are attached to the beam by a single bolt, the plow will be firmly but detachably secured, so that it can be shifted readily at any time to alter the lead of the beam.

Improved Leather-Scalloping Machine.

Isaac P. Hall, Miamisburg, Ohio.—A roller is made of a length equal to the breadth of the strip of leather to be operated upon, and in its face are formed two zigzag grooves having the form of the required scallop, and in which are placed two small blocks, which serve as knife-holders, and which slide along the grooves as the roller is revolved. To the sliding blocks are pivoted the ends of two rods, the other ends of which receive pins attached to a bracket, which is secured to the bench. To the sliding blocks are attached knives which project upward, so as to enter zigzag grooves in another roller, which is made to overlap the ends of the roller first mentioned. The rollers may be made of various lengths, according to the breadth of the leather strips to be operated upon.

Sugar from Sorghum.

In reply to a correspondent who asked for the best process for causing sorghum sirup to crystallize so as to make sugar, we give the following by Stewart: "At the close of the boiling, transfer the cooler to the crystalizing room. Here two modes of treatment are to be pursued to suit the kind of product to be obtained. By the first method, a fair, yellow sugar, of a quality equal to that of the ordinary brown sugar of commerce, is the result. By the second, white sugar, or any grade intervening between it and the crude article, may be obtained. As a pre-requisite to success by either method, the crystallizing and draining rooms should be uniformly heated to a temperature of not less than 80° Fah. To secure this, a close room is needed, opening by a door into another apartment instead of by an outside door. The crystallizing vessels should be roughed along the sides and a stove placed in the center. Crystallization and drainage should be performed in the same vessels, and their form should be such as to conduce to both these ends. 1. Crude sugar of good quality and large grain will uniformly result from well defecated sirup of the proper density, at a temperature of 80° to 90° Fah., by means of slow crystallization and natural drainage. The vessels should be shallow to admit of the speedy downward passage of the molasses through the crystallized mass, and their bottoms should be inclined sufficiently to secure its rapid transmission to a common outlet. They should be of a uniform size, and, in order to secure a large grained crystallization, should be made moderately large. Vessels conforming to these requirements may be of various forms; but for convenience and general efficiency I give the preference to a form of vessel which the experience of nearly a century has not modified for the better. I refer to Dutrone's crystallizing box, thus described by himself: 'Experience has proved to me that the quantity of matter which combines the greatest number of advantages in the crystallization of cane sugar is fifteen or sixteen cubic feet, for which reason the dimensions given to the crystallizing vessels are five feet in length by three feet in breadth. The bottom is formed of two planes, inclined six inches, the intersection of which forms a groove in the middle. If this groove are twelve or fifteen holes of an inch in diameter, to permit the sirup to flow out. The depth is nine inches at the sides and fifteen inches at the center. The vessels should be made of boards one inch thick, and lined with lead' (or better, coated heavily with iron paint). 'Before lining it, the holes should be bored in the groove, and burnt out with a hot iron from the inside, so as to form a small cavity surrounding the hole, in consequence of which not a drop of sirup will remain after draining.' Such vessels combine every possible advantage in crystallizing and purging with the requisite strength. 'The crystallizing vessels rest upon strips of wood two inches thick and three inches broad, which are fastened to and supported by upright posts eight or ten inches high, at the distance, laterally, of ten inches from the middle line. Troughs connecting with a cistern on a lower level receive the molasses as it drips from the sugar.' These vessels, when filled to within 3 inches of the top, will hold about 75 gallons of sirup for granulation, weighing nearly 1,000 lbs., of which one half, or 500 lbs., will be good dry sugar. The depth of the crystallizing mass in the boxes may sometimes be diminished to 3 inches at the sides, where the bottom is most elevated, and 9 inches in the center, when there is reason to apprehend any difficulty of drainage by reason of the presence of an undue amount of grape sugar, or otherwise. After the molasses has all drained out, this depth will be much diminished, and the large surface of sugar exposed permits it to dry speedily. The number of these boxes that will be required will of course depend upon the amount of work to be done, and the length of time that must elapse before they can be refilled and used again. Two weeks is as short a time as can be reckoned upon for the completion of the crystallization and drainage. It will be found that one of these vessels will be required for each 450 or 500 gallons of juice delivered by the mill during that period. Close the openings in the bottom of the box with long, smooth, wooden plugs, abruptly pointed, which may be allowed to project through the holes into the inside of the box two or three inches. Range the boxes in order on the supporting rack, around the side of the room and over the dripping troughs, which are so arranged as to convey the molasses into a pointed wooden or tin gutter, and thence into a cistern. The dripping troughs may be simply short open conductors of the same materials. In twenty-four hours after the thick sirup has been passed into the crystallizing box from the cooler, the formation of crystals of small size will generally have commenced. They may then be seen along the edges of the yet liquid mass, but on the bottom of the box they will be found in the greatest abundance, and may be detached and brought to the surface at the shallow sides of the box, by means of a knife blade or the wooden scraper, which should always be at hand. The last-named implement is simply a long paddle of ash or hickory wood, with a stout handle and thin blade. With this the fine crystals should be loosened from the bottom and sides and stirred into the mass so as to distribute them as equally as possible through it, that they may act as nuclei for the formation of larger crystals. Generally in twenty-four hours after this operation, and often in less time, the crystallization will have pervaded the entire mass. When this is found to be so, then gently withdraw the stoppers and permit the molasses to drain. The sugar will be dry in ten days or less thereafter. It may then be shoveled into boxes or barrels, and the crystallizing boxes refilled."

Notes & Queries

H. C. S. will find directions for molding rubber on p. 283, vol. 29.—E. M. G. will find a recipe for soldering brass on p. 364, vol. 29.—F. W. Z. can find a recipe for a copper dip for iron on p. 90, vol. 31.—C. C. can cement glass to tin by using the preparation described on p. 298, vol. 30.—J. B. can measure the cylinder of his engine by the formula given on p. 16, vol. 29, and by that on p. 54, vol. 30.—R. H. H. can fasten rubber to rubber by using the cement described on p. 203, vol. 30.—J. J. F. will find directions for silvering glass on p. 234, vol. 30.—M. W. H. will find a description of mica on p. 88, vol. 24.—C. E. G. will find directions for stereotyping on p. 363, vol. 30.—N. L. F. can remove paint from window panes by the method described on p. 88, vol. 32.—T. J. C. can blue guns by the process given on p. 123, vol. 31.—F. W. will find directions for molding from living objects on p. 58, vol. 24.

(1) J.E.E. asks: What degree of heat will a diamond bear without injury? Diamonds are said to be destroyed at about 14° Wedgewood or 1,820° Fahrenheit, but they vary in hardness. What would be the effect of a cherry red heat upon a very hard diamond? Would it have a tendency to soften it? What heat will cause a diamond to crack and chip off on the outer surface? A. Heat would not soften a diamond, neither would the stone crystallize at extremely high temperature. Heated intensely, it would burn and be converted into carbonic acid gas, an exceedingly small residue being left behind.

(2) J. J. asks: Will a slit extending from top to bottom in the glass chimney of a lamp be a preventive from breaking by partial rapid expansion or contraction? A. Yes. 2 Do you think a slit would impair combustion? A. No. 3. Does glass require tempering or annealing before leaving the factory? A. Yes.

(3) A. A. F. says: I have tried your recipe for staining wood to a black walnut color, as follows: Water 1 gallon, washing soda ½ oz., chromate of potash ¼ oz. This will not make a stain. It settles at the bottom; and after standing a few moments the water becomes almost clear. A. We have tried this stain and had no difficulty in obtaining a very fine stain, perfectly counterfeiting the color of black walnut. The settling or precipitation of your solution is due probably to impurities in the chemicals or water used. Separate your water into two portions, in one of which dissolve the soda and in the other the bichromate of potash. The solution of soda should be perfectly clear; and when added to the other solution, it should impart a bright yellow color to it. The wood should be steeped in this solution for about one hour, or until the desired shade is obtained. A gentle heat will hasten the process.

(4) M. H. K. asks: What is the kind and character of change that takes place in white of egg when beaten from the shell into a stiff froth? A. The continued beating causes the albumen to become aerated, or mixed with a large quantity of air bubbles.

How can I make a stamp or press, out of other material than wood, to quickly press and shape a lump of butter to fill the table butter dish? A. There is no material, to our knowledge, that will answer the purpose so well as wood.

1. How can I polish a pearl, found in an oyster? A. Try rouge powder. 2. Have such pearls any value compared with others? A. They have no commercial value.

(5) F. W. H. asks: Is rottenstone and linseed oil good for repolishing a piano? A. The rottenstone is used as a polishing powder, the linseed oil to cleanse the surface after having been polished. They are not mixed together.

How can I prepare glue, so as to use without heating? A. Dissolve the best isinglass in the strongest (glacial) acetic acid.

(6) C. R. S. B. says: I curl my hair with a thin gum arabic water. Is it injurious? A. It is of no benefit, and probably of no more injury to the hair than the use of too much water, rendering the hair stiff and dry. 2. What is good to prevent the hair from falling out? A. See p. 363, vol. 31.

(7) E. B. says: I have some elder wine which last summer turned sour, but not sour enough for vinegar. I added ½ pint alcohol to the gallon when made. How can I make vinegar of it, fit for the table? A. Add to it a little yeast, or mother of vinegar, which will hasten fermentation.

(8) W. C. says: I have a lot of molded sandstone, saturated with coal oil. How shall I take the oil out? A. Heating to a moderate temperature might be tried, if practicable. Sometimes chalk and magnesia are used to absorb and extract oil stains.

(9) A. M. F. asks: How can a harmless substance be magnetically polarized, to convey into the human system the positive or negative forces, so as to circulate in the blood and so through every part and atom of the body? A. There is not, to our knowledge, anything that is susceptible of magnetic polarization that may be taken into the system in the way you describe.

(10) E. B. J. asks: 1. What can be added to tobacco that will cause the odor of the smoke to smell sweet? A. Try lavender. 2. Can it be made pleasant by passing the smoke through perfumed water or alcohol? A. No.

(11) B. S. asks: What is the behavior of potassium and sodium, and similar metals, in absolute or nearly absolute (95°) alcohol? A. When sodium or potassium is added gradually to absolute alcohol, a brisk action occurs, the temperature rises rapidly, and the metal is dissolved; while an extrication of pure hydrogen takes place, and a fusible, crystalizable, deliquescent compound is formed, which has received the name of sodium alcohol (or potassium alcohol) or of ethylate of soda (or of potash].

(12) W. E. says: I have tried many recipes for tinning articles made of cast iron, some of which are malleable; the last I tried was: "Cover the articles in a solution of sal ammoniac, then dip them in melted tin," but it would not work. A. The operation only succeeds well when the surface of the metal to be tinned is quite free from oxide, and when during the operation the oxidation of the molten tin is prevented. The former requisite is attained by the use of dilute acids, rubbing and scouring with sand, pumicestone, etc. the latter condition, by the use of either rosin or sal ammoniac, both of which cause the reduction of any oxide that may be formed. The objects intended to be tinned are heated nearly to the melting point of tin; they are then dipped into a vessel containing the molten metal, and rubbed with a piece of hemp over which some sal ammoniac is strewn. Pins, hooks and eyes, small buttons, and similar objects are tinned by being boiled in a tinned boiler filled with water, granulated tin, and some cream of tartar. The tinned objects are dried by being rubbed with sawdust or bran. In the manufacture of tinned sheet iron, technically termed tin plate, the iron must first be thoroughly scoured, so as to present a clean metallic surface, and then immersed in baths of molten tin covered by a layer of molten tallow to prevent the oxidation of the metal. On being removed from the tin bath the sheets are immersed in a bath of molten tallow to remove any excess of tin, wiped with a brush made of hemp, next cleaned with bran, and packed.

(13) S. N. M. says, in reply to O. H., who asks: What is the force of blow of the pile of a pile driver, whose weight is 100 lbs., falling 20 feet? "Force is any cause which moves or tends to move a body. Weight is the measure of the force of gravity. Momentum is the quantity of motion, the impetus, the force with which one body strikes another, and is equal to the weight×velocity." This must be the force of the blow of the pile driver. To find the time of falling, equal to $\sqrt{20 \text{ feet} \div 16\tfrac{1}{12}} = 1{\cdot}115$ seconds. To find the velocity $= 1{\cdot}115 \times 32\tfrac{1}{6} = 35{\cdot}861$ feet per second. Therefore, $35{\cdot}861 \times 100 = 3586{\cdot}1$ lbs. = the force of the blow. If there be any demonstrable error in the above, I shall be pleased to learn it. I conceive it possible that it may be said that the momentum is not the same as the force of the blow, estimated in pounds. A. The definition of momentum, given above, that it is the force with which one body strikes another, is incorrect; and indeed, this definition is ordinarily given incorrectly, in elementary works on mechanics. The force of the blow of a pile driver, as we understand it, is a certain weight which would produce, by steady pressure, the same effect as the falling body. The amount of the weight can only be ascertained by experiment.

(14) C. J. L. asks: How can I electrotype from an iron solution instead of copper? A. Use the protosulphate or neutral chloride of iron, a single battery cell, and an iron positive pole.

(15) J. C. C. asks: Have dispatches ever been successfully transmitted on the same wire in both directions at the same time? A. Yes. The Western Union Telegraph Company has been successfully using Stearns' method of sending two messages over the same wire at the same time for several years past.

(16) C. A. C. asks: Will you please explain the process of electrotyping, and the kind of metal used? A. An impression of the objects which you desire to reproduce is first taken in gutta percha or wax, which is then covered with plumbago by brushing with a camel hair brush. The impression is then attached by a wire to the zinc pole of a weakly charged Daniell cell, and a copper plate is attached by a wire to the copper pole of a battery. The impression and copper plate are then dipped into a strong solution of sulphate of copper, when the copper of the solution will begin to deposit itself on the impression, first at the black-leaded surface in the vicinity of the connecting wire; then it will gradually creep over the whole conducting surface. It is usual to keep the impression in the solution for about 24 hours, when the copper deposited on it will have formed a tolerably strong plate, which can be easily removed from the wax. On the side of the plate next the matrix, will be found a perfect copy of the original object.

(17) L. W. asks: In a galvanic pile composed of copper and zinc plates, 4 inches square, how many pairs would it take to produce a shock that would be felt? A. One hundred pairs would produce a perceptible shock.

(18) T. J. W. asks: Is it twelve o'clock when the clock strikes the first stroke, or when it strikes the twelfth? A. As a general thing, a clock indicates the hour of twelve at the first stroke.

(19) R. K. asks: What is the objection to driving ferrules in boiler tubes, or to caulking the tubes, when the boiler is full of water? A. It cannot be ordinarily done with safety and convenience.

(20) C. R. asks: Which is the most powerful wheel, the overshot or the turbine? A. The following data may be accepted as generally correct for the average performance of the different kinds of wheels: Percentage of the power of the water that is utilized by the wheels: Overshot and breast wheels from 75 to 80, undershot wheels from 40 to 60, turbines from 60 to 80.

(21) E. E. E. asks: Will cast iron make a safe head on which to put four cutters for a wood molding machine, the heads to be from 2 to 6 inches across and 6 inches square, with 1¾ holes in center for shaft? The shaft is to revolve at the rate of from four to six thousand per minute. A. Possibly, but wrought iron or steel would be preferable.

(22) W. H. F. asks: Can you give me the rule for determining the electromotive force necessary to overcome a given resistance? For instance, on a line of say 100 miles, having a resistance of about 1,500 ohms, how many Daniell's cells would be required to operate it satisfactorily? A. Much depends upon the size of the wire, its insulation, and the delicacy of the receiving instruments used. Assuming the wire to be of No. 8 gage, the insulation of the Kenosha pattern, and the instruments Morse relays of 150 ohms resistance, 50 cells would be sufficient.

(23) J. C. G. asks: What tools and materials would a person need to make small working models of steam engines? A. A lathe, a small planer, and a good vise bench, with hammer, files, chisels, center punch, scribers, etc.

(24) W. P. says: I inclose some indicator cards from the compound engine that I run in a flour mill. What do you think of them? A. They appear to be very fair. We would be glad to receive from you a brief account of the performance of the engine, giving average power exerted, consumption of fuel, water, oil, and any other matters of interest that you can furnish.

(25) S. B. H. says: You recommend heating wire ropes. All the wire rope that I ever saw had a small piece of rope in the middle, for the purpose of making it pliable, as I suppose. Would not the heating of the rope red hot injure the hemp? A. Wire rope is made with either a wire or hemp center, according to the wishes of the purchaser. Our correspondent's question implied that his rope had an iron center.

(26) J. D. asks: Will it add to the power of an engine to increase the length of cylinder from 12 to 16 inches, and proportion all other parts to the increased length of cylinder, the number of revolutions and the pressure of steam remaining the same as it did on the 12 inch cylinder? A. The power will be increased if the alteration is made.

(27) R. M. R. says: On p. 27, vol. 32, I find this question (No. 64): "At what speed would an engine, having 2 inches bore and 4½ inches stroke, drive a boat 18 feet long, 5 feet wide, and drawing 6 inches of water? The engine will have 100 revolutions per minute and 50 lbs. steam." You reply: "The engine would be entirely too small to give a satisfactory result, unless a much higher pressure of steam and greater piston speed were employed." Would not such an engine have at least one man power under the conditions named? If so, the engine ought to be able to do as much work as a boy of fourteen could do: pull such a boat with a pair of oars at about 3 miles an hour. I have often done this when I was about fourteen. If a screw loses so much of the power as to make the engine less powerful than a small boy, why did you not advise F. C. R. to connect a long cylinder with a pair of oars, or construct a machine to work oars? A. As you surmise, one man power applied to the screw of a small boat would be entirely too small, on account of the loss from friction and slip. If you have any plan for a boat with steam oars, which you have proved by experiment to be more economical and satisfactory than the ordinary modes of propulsion, we will be glad to hear from you again.

(28) W. & B. ask: Is tannate of soda safe to use in all cases, for removing scales from boilers? A. Try it.

Is superheating of steam any advantage in economy of fuel, and is it safe? A. This depends upon the manner in which you are using your steam. It is safe, if properly done.

(29) A. F. A. asks: Has the coefficient of expansion of hard rubber been determined? A. We do not remember ever having seen it, and would be glad to hear from any of our readers who may have information on the subject.

(30) J. G. says: I have just set an 8 foot by 34 inches tubular steam boiler for running engine and heating building. The inspector says that it should be run with water within 6 inches of the top (over 3 solid gages) to save the tubes from unequal expansion; while I contend that there should be at least 16 inches steam space, 2½ gages water, to have dry steam and work to the best advantage. Which is right? A. It is common to carry water in such boilers from 2 to 4 inches above the top row of tubes.

(31) C. S. D. asks: Does a column of water flowing to a hydraulic ram through a pipe twenty feet long, inclined at an angle, with a vertical fall of ten feet, give more force than flowing through a ten foot pipe attached to the ram in a vertical position? A. No.

(32) J. H. P. says: A bell has been placed in a church spire, but only a heavy and strong man can ring it. A. says that if the bell be hung higher in the yoke it will ring more easily, and the tongue will strike heavier and louder. B admits the former but maintains that the tongue will strike with less power and consequently emit less sound. Which is correct? A. The question cannot be answered, positively, without more data. If the bell is raised in the yoke, it can be moved more easily, but it will be necessary to swing the yoke through a greater angle in the same time as before to produce the same sound. Hence the ringer will have to work more quickly than before.

What should be the length and width of an iron wedge two inches thick, to be used for splitting wood? If it be too long, it will bend in crooked-grained wood. If too short, it will fly back when driven into frozen wood. If too wide, it will drive hard. If too narrow, it will merely displace the wood without splitting. Should the faces of the wedge be plane surfaces with sharp corners, or oval, like those of an ax with rounded corners? A. It would seem to be better to have different wedges for the several kinds of wood. They are commonly forged, not finished, with sharp corners.

(33) H. A. H. asks: Would a wire, cut or grooved out like the threads of a bolt, cut wood readily? A. Not unless it was tempered and had a cutter at the end, which would change it into a common auger.

(34) K. asks: If steam at 100 lbs. per inch be confined in a certain area and the area be doubled, what will be the pressure in the enlarged area? In other words, what is the elasticity of steam? A. The pressure varies nearly inversely as the volume. You will find precise formulas, which are somewhat complicated, in any good treatise on heat.

(35) T. E. L. says: I notice that you state in your answer to B. L. H. that the pressure is greatest at the bottom of a boiler. This being the case, why is it that an injector will supply a boiler? A. On account of the difference in area of the steam pipe and orifice through which the water is forced, the velocity of the steam is greater than that of the water; so that steam at boiler pressure, moving at a high velocity, can overcome a much greater pressure if the resistance moves at a less velocity. Similar action takes place in the case of a lever where a small weight moving fast raises a large one moving slow. It can also be observed in an ordinary system of ropes and pulleys, and in numerous other instances, which will doubtless occur to you.

(36) W. C. R. asks: If I take a cylinder with an outlet and stopcock to it, and compress air in it to a pressure of 100 lbs. to the square inch, and put it on a small boat, and then open the stopcock, letting the air escape, the air on the outside traveling in the same direction, and at the same speed as that coming out of the cylinder, will it propel the boat? I say it will not, as there is no reaction. A friend of mine claims that it will. Which is right? A. Your friend.

(37) J. A. H. says: 1. T. L. maintains that if you half fill a boiler with cold water, disconnect the pump (if any be attached) and heat up to 130 lbs. pressure, all the water will be turned into steam, in other words, there will be no water in the boiler by the time it reaches 130 lbs. pressure. I say that this is wrong, and that only a small portion of the water will be turned into steam, which steam occupies that portion of the boiler not occupied by the water. Which is right? A. You are. 2. T. L. says that if you take a hollow cylinder or other vessel of sufficient size to contain 1,000 gallons gas in a liquid state (not 1,000 gallons liquid), force gas into it under proper conditions until it is full of liquefied gas, then draw off 500 gallons gas, that the remaining 500 gallons (less the quantity evolved into gas to full space above liquid) in the vessel will not and cannot be in the liquid state. I say it can be in the liquid state under such conditions, and will be in such an instance, provided the exhaustion of 500 gallons of gas has not reduced the pressure below the pressure at which the gas liquefies. Who is right? A. You are. 3. He further maintains that if you take any vessel, half fill it with fluid and raise the internal pressure to 150 lbs. per square inch (either by heat, pumping in air, or the efforts of a liquefied gas to reassume the gaseous condition) you cannot hear such fluid shake and gurgle if you agitate or shake the vessel; in other words that, if there be any fluid in such vessel under such pressure, it will not change position by turning the vessel upside down and other movements. I say he is wrong. Who is right? A. You are.

(38) J. G. P. asks: Is there any invention to facilitate the safety of treasure in case of fire or foundering of a vessel at sea? Could not a large floating preserver be made and placed in the ship with the treasure enclosed, and, when found necessary, be given to the waves with better hopes of recovery than if it went down with the ship? A. The idea is quite practicable, and is, we think, practised. Your turbine device would not work.

(39) W. A. N. asks: How is linseed oil manufactured? A. By cold pressure in a mill. Sometimes the seed is roasted first to destroy a gummy matter in the outer envelopes. This frees the oil from mucilage, but renders it more acrid and higher in color than the cold process, which, however, should be used in preparing oil for medicinal purposes. The residue (oil cake) is a most valuable food for cattle.

(40) J. S. B. says: The following is a good recipe for welding cast steel: Take copperas 2 ozs., saltpeter 1 oz., common salt 6 ozs., black oxide of manganese 1 oz., prussiate of potash 1 oz.; pulverize and mix with welding sand, 3 lbs. Use it in the same way as you would sand.

(41) C. F. asks: 1. From what substance is methylic ether made? A. Methylic ether or oxide of methyl is obtained by distilling 1 part of pyroxylic spirit and 4 parts of oil of vitriol; a colored gas (homologous with ethylic ether) is disengaged. It is accompanied with carbonic and sulphurous acids, which may be removed by allowing the gaseous mixture to stand 24 hours in contact with slacked lime. The gas is liquefiable at a temperature of —33°, and boils at —6° (Berthelot). 2. What ether is mostly used in the manufacture of artificial ice? A. Ethylic or vinic ether, sometimes called sulphuric ether.

(42) F. G. H. asks: 1. What is nitroglycerin made of? A. Nitroglycerin is a compound formed by the action of a mixture of highly concentrated nitric and sulphuric acids for a few minutes on glycerin. 2. Can the ingredients be mixed in one or two seconds, so as to be ready for use? A. No; the manufacture requires great care and careful watching.

(43) J. H. asks: How can I make distilled water? A. By boiling water and condensing the steam in a tube or coil of block tin pipe surrounded by cold water. Another way is by using the little device shown in the engraving, in which the steam condenses inside the conical cover, and descends the same, being caught by a projecting gutter and conveyed to the spout. A cloth kept wet with cold water on the top will facilitate the condensation.

(44) W. R. B. says: 1. In your issue of August 28, 1874, I see a description of a new light for photographers, which is produced by passing hydrogen through iodide of ethyl in which zinc has been digested. Will you explain what iodide of ethyl is? A. In order to prepare this ether, 100 parts of alcohol are placed in a retort, and a small amount of iodine is introduced; phosphorus is added in small quantities until the liquid becomes colorless; a fresh portion of iodine is then added, and then a fresh quantity of phosphorus, until about 200 parts of iodine and 2 or 3 parts of phosphorus have been added. The mixture thus obtained must be cooled by immersing the bulb of the retort after each addition in cold water, otherwise a large proportion of the phosphorus will become converted into the red variety, which is not susceptible of being attacked by the iodine at low temperatures. After the reaction has terminated, the liquid is distilled by the heat of a water bath, taking care that the iodine (as shown by its brown color) is in slight excess. The distillate should be washed with water, digested on chloride of calcium, and redistilled. 2. Is metallic zinc meant? A. Yes. 3. Is there anything dangerous about this light in careful hands? A. No.

(45) P. D. asks: Is there any process by which an amethyst can be restored to its original color after being heated? A. Not if the color has been destroyed.

(46) E. B. G. says: In drilling into rock which forms the pavement of coal, I struck a vein of water, which soon turned to a deep red color, and tasted strongly of alum. Is there probably alum in it? A. It was probably colored by suspended oxide of iron, and contained compounds derived from the pyrites, etc., analagous to the sulphate contained in alum.

(47) A. T. asks: How can I take impressions from sunk lines on copper plates? A. Obtain a fine copper plate ink from a reputable maker, dab on the (warm) plate with a rolled flannel, wipe the plate quickly with a soft leather and then with the palm of the hand. The ink should be stiff enough to remain in the engraved lines, although the surface of plate is perfectly cleaned as described. Print by heavy pressure between rollers.

(48) W. J. L. asks: Can carbon gas be liquefied by any known process, and what are the means? A. Carbon gas is rather an indefinite term; carbonic acid gas can be liquefied. Take bicarbonate of soda with water and place it in a strong wrought iron bottle, together with a narrow pot nearly full of sulphuric acid. The bottle is closed by a screw plug, and then agitated so as to shake the acid out of its pot, and bring it in contact with the carbonate. The great pressure produced by the evolving gas condenses the carbonic acid to the liquid form. Carbonic oxide, however, has resisted all efforts for its liquefaction. Marsh gas (CH_4) a combination of carbon and hydrogen, is, next to hydrogen, the lightest of known substances. It has resisted all efforts of cold and pressure to liquefy it. Ethylene (C_2H_4) was condensed to a liquid by Faraday. Coal gas is a mixture of gaseous compounds given off by coals. It consists of, in 100 parts: Hydrogen 45·58 (cannot be liquefied), marsh gas 34·90 (cannot be liquefied), carbonic oxide 6·64 (cannot be liquefied), ethylene 4·08 (can be liquefied), butylene 2·38 (can be liquefied), sulphuretted hydrogen 0·29 (can be liquefied at a pressure of 17 atmospheres), nitrogen 2·46 (cannot be liquefied), carbonic acid 3·67 (can be liquefied). This analysis is of the gas supplied to the city of Manchester, England.

(49) O. L. asks: 1. Is aluminum worked in this country? A. It is not. The metal which comes into this country is mostly manufactured in France. There have been several manufactories in France, namely, at Salyndres and Amfreville, and one in England, at Washington, county Durham. 2. Can you give the process of extracting it from clay? A. The metal has not, as yet, been profitably extracted from ordinary clay (silicate of aluminum); the nearest approach to it has been the process of Professor Rose, of Berlin, who first used cryolite, which is a compound of the double fluorides of aluminum and sodium. This mineral, being treated at a high temperature with sodium, yields aluminum and fluoride of sodium, and the latter, treated with quicklime, yields caustic soda and fluoride of calcium. Aluminum is also obtained from bauxite, native hydrate of alumina, which, having been previously mixed with common salt and coal tar, is next heated in an iron retort with chlorine gas, the result being the formation of carbonic oxide, and the double chloride of aluminum and sodium, which volatilizes, and is condensed in a reservoir lined with glazed tiles. The salt so obtained contained iron, and consequently the aluminum derived from it is alloyed with that metal. The double chloride of aluminum and sodium is converted into metallic aluminum by being heated in a reverberatory furnace with sodium, while the aluminum is set free. A slag is formed, consisting of the double salt with excess of chloride of sodium. 3. If aluminum can be readily worked, why is it not in common use? A. Aluminum is now not so much in use; when first introduced, aluminum jewelry was much employed. The metal is at present more usefully employed for small weights, light tubes for optical instruments, and to some extent for surgical instruments. The price, however, of this metal ($1.50 per oz.) is too high to admit of its extended use.

(50) W. G. C. asks: 1. What kind of ink is used for machine ruling? A. Any good fluid ink will do. Dilute with water to the required tint, and add ox gall to prevent the ink running, and to hasten drying. 2. What kind of pens are used? A. They are cut out of very thin brass by a tool constructed for the purpose. 3. Is a blotting roller used after the paper passes from the pens or points? A. No.

(51) P. O. T. asks: What is the nature of manganese? A. Manganese is a combination of oxygen, 36·7 per cent, with metallic manganese, 63·3 per cent. It usually occurs in deposits, being frequently associated with ores of iron. If the ore is good, it is fit for use directly. It is extensively mined in Thuringia, Moravia, and Prussia. It is common in Devonshire, Somersetshire, and Aberdeenshire in Great Britain. It is found in various parts of Vermont, also in Massachusetts, Connecticut, and other parts of the United States, New Brunswick and Nova Scotia. The pure article is sold in New York at from 10 to 15 cents per lb.

(52) A. B. P. asks: How can I prepare paper for cartridges so that the explosion of the cap will ignite the powder without first opening the cartridge? A. Cartridges of this kind are made by enclosing the fulminating powder between disks of hard, stiff paper in the head of the cartridge.

(53) J. H. K. asks: How can mildew, stains, etc., be removed from gold lace? A. For this purpose, no alkaline liquors are to be used; for while they clean the gold, they corrode the silk, and change or discharge its color. Soap also alters the shade, and even the species, of certain colors. But spirit of wine may be used without any danger of its injuring either color or quality, and, in many cases, proves as effectual for restoring the luster of the gold as the corrosive detergents. But though the spirit of wine is the most innocent material employed for this purpose, it is not in all cases proper. The golden covering may be in some places worn off, or the base metal, with which it has been alloyed, may be corroded by the air, so as to have the particles of gold disunited, while the silver underneath, tarnished to a yellow hue, may continue of a tolerable color; so it is apparent that the removal of the tarnish would be prejudicial, and make the lace less like gold than it was before.

(54) N. J. P. asks: What is bleaching powder? A. It is commonly called chloride of lime. It is made by passing chlorine gas over moistened lime. It is a moist grayish powder, and is soluble in 10 parts of water, any excess of hydrate of lime remaining undissolved. It deteriorates by keeping; when freshly made, it may contain 30 per cent of chlorine, but often has less than 10 per cent. It is decomposed by acids, yielding chlorine. It consists of hypochlorite of lime and chloride of calcium, with water and excess of lime. It is used for bleaching, and as a disinfectant. We do not understand your other question.

(55) J. G. C. says: I doubt very much if A. W. B. ever kept cider sweet in the way he mentions. If the fermentation is not checked, it will inevitably turn to vinegar. I have been advised to strain the cider through sand, as it comes from the press into the barrel, so as to get it free from as much impurity as possible; put the barrel in a cool place, taking care not to freeze it, leave the bung out a few days till the most violent of the fermentation has taken place, then bung it up tight bore a small gimlet hole near the bung, and put in a spile; watch it closely, and once in three or four days draw the spile, so as to relieve the pressure on the cask, otherwise it may burst. Judgment must be used in the matter, and the time must be lengthened gradually for giving vent; finally leave it to itself; and in the following February, if you wish to bottle it, take a clear, cool day for the operation, use good strong bottles and the best of corks, and drive them in with a wooden mallet, first softening them with a cork squeezer. By putting a moderate sized lump of the best white sugar into each bottle, it will tend to make it more sprightly. The bottled cider must be kept in a cool place. The later in the year that cider is made, the better it will keep.

(56) A. K. says, in reply to J. C. & Co., who ask as to why millers steam their wheat before grinding: There are several good reasons for this. The first reason is that it improves the quality of the flour and increases the yield. It also makes a broader bran, proving what I have already said; for if you can make a broad bran, you will evidently have less of it to contend with in your bolts. In fact, it puts the whole system of milling in a superior condition for manufacturing a choice article of flour. Some millers object to steaming

on the ground that it requires more dressing of stones, and they have ample reason for making this their standpoint. In very dry and cold weather, when there is trouble in keeping up the grade of flour, steaming serves instead of rain or thaw. We can do better milling when the weather is moist and damp.

(57) W. T. B. says, in reply to H. D., who asks how to get rid of red spiders: The minute insect known to florists as red spider is usually of a bright red color, though some are brown and others almost green. They seem to increase most rapidly in a dry, hot atmosphere, and upon plants that are not growing well, or that have been allowed to suffer for lack of water at the roots. They infest the under side of the leaves, and apparently shun the light; but when very numerous, they may be found upon all parts of the leaves and stem. The upper part of the leaf, opposite where the insects are at work, becomes light colored and dusty looking. In greenhouses, they are most troublesome in the warmest part of the house; but I have seen them in a house where the temperature was allowed to fall to 40° at night, and also on plants growing in the garden. I would suggest the following treatment: Syringe the plants freely with water once or twice a day, taking care to wet the under side of the leaves. Keep the air of the room moist, by setting pans of water on the flues, heating pipes, or register; give all the light possible, and ventilate freely whenever the weather will permit. When the soil is dry, give sufficient water to moisten all the soil in the pot; and water no more until the surface is dry again. If plants seem stunted or sickly, re-pot them in fresh, rich soil, or use some other means to induce a healthy growth. The red spider is anything but an aquatic insect, and will yield to the hydropathic treatment, if it is persisted in.

(58) A. H. says: E. S. S. can season his croquet balls after they are turned by brushing them over with linseed oil, then baking them in the oven (slowly at first) to get the oil into the pores of the wood, repeating the oil coating three or four times, and then storing them away for the oil to dry. This will not only keep them from checking, but will make them waterproof and keep them from rotting. Last winter I made some plane handles out of a piece of a plum tree, 5 inches in diameter, those treated with oil stood the sun's rays without the least check; the others, not oiled, checked so as to make them useless.

MINERALS, ETC.—Specimens have been received from the following correspondents, and examined, with the results stated:

H. D. P.—Having subjected your sample of paper to the usual tests, we failed to discover the presence of arsenic.—J. T.—Your box contained but one specimen, a piece of basaltic rock, the only value of which would be in building.—W. M. L.—It is a fossil coral.—A. B. H.—It is galena, containing 85 per cent of lead and 15 of sulphur.—S. M.—It is quartz grains, yellow mica, black mica, and fragments of augite, which is a silicate of lime, magnesia, iron, and alumina, but is of no value in the arts.—P. R.—It is a superior red oxide of iron. We have known several specimens to contain as high as 70 per cent of iron. It will make red paint and, if in sufficient quantities, will be a valuable ore of iron.—H. P. E.—No. 1 is quartz grains, colored red with oxide of iron, and mixed with small crystals of black mica. No. 2 is the same as No. 1, but with yellowish mica also. No. 3 is quartz rock with yellow mica. No. 4 is the same as No. 2, with more quartz. No. 5 is similar to No. 3.—R. E. M.—It is asphalt. You have already a knowledge of its valuable qualities. It is a highly bituminous asphalt, capable of yielding illuminating gases and oils, and of being used as a paint. You have only to develop the deposit.—E. T. D.—It is garnet in mica schist.—N. S. S.—It is garnet. The crystalline form is the rhombic dodecahedron, and belongs to the variety of garnet called the iron-alumina garnet, which is common.—A. J. R.—It is difficult to determine the value of stones from such small specimens. If you will send us a stone of the proper dimensions (3 inches thick), and finished on one surface, we will give it a practical trial.—H. L. H.—No. 1 is a quartz rock containing scales of yellow mica, of no value. No. 2 is quartz rock with some iron, but too little to be worth working. No. 3 is a crystal of aragonite, which is carbonate of lime.

COMMUNICATIONS RECEIVED.

The Editor of the SCIENTIFIC AMERICAN acknowledges, with much pleasure, the receipt of original papers and contributions upon the following subjects:

On Canal Towage. By R. B. C., and by W. R. W.
On Filling Teeth. By A. H. B., and by J. G. C.
On Springs as Motors. By M. W. P.
On the Patent Office. By O. P. S.
On Furnaces and Flues. By H. M. S.
On Anointing in Cases of Fever. By R. P.
On a New Lamp. By D. D. N.
On a New Bridge. By J. A. P.
On Spiritualism. By H. M., and by F. S.
On Lacing Belts. By R. G.

Also enquiries and answers from the following:

J. P. W.—N. C. P.—J. H. K.—J. S. B.—W. X. Y.—H. M.—T. F. M.—J. S. E.—T.—W. S. D.—H.—F. G. S.—E. A.—S.—J. E. E.—W. C. B.—S. D.

HINTS TO CORRESPONDENTS.

Correspondents whose inquiries fail to appear should repeat them. If not then published, they may conclude that, for good reasons, the Editor declines them. The address of the writer should always be given.

Enquiries relating to patents, or to the patentability of inventions, assignments, etc., will not be published here. All such questions, when initials only are given, are thrown into the waste basket, as it would fill half of our paper to print them all; but we generally take pleasure in answering briefly by mail, if the writer's address is given.

Hundreds of enquiries analogous to the following are sent: "Who makes steam cracker-making machinery? Who deals in old coins? Who makes sample trunks? Who publishes works on the construction of lights for lighthouses? Where are the best carpenter's tools to be obtained?" All such personal enquiries are printed, as will be observed, in the column of "Business and Personal," which is specially set apart for that purpose, subject to the charge mentioned at the head of that column. Almost any desired information can in this way be expeditiously obtained.

[OFFICIAL.]

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DESIGNS PATENTED.

7,969.—DESK.—W. T. Bromwell, St. Louis, Mo.
7,970 to 7,976.—CARPETS.—R. R. Campbell, Lowell, Mass.
7,977 to 7,981.—CARPETS.—J. M. Christie, Kidderminster, England.
7,982.—SIDE OF CASE.—J. E. Hunter, N. Adams, Mass.
7,983, 7,984.—CARPETS.—C. S. Lilley, Lowell, Mass.
7,985.—CARPET.—C. W. Swapp, Lowell, Mass.
7,986.—CARPET.—R. Allan, Yonkers, N. Y.
7,987.—SMOKING PIPE.—I. Demuth, New York city.
7,988.—BOTTLE.—E. R. Durkee, Brooklyn, N. Y.
7,989 to 7,991.—CARPETS.—E. Petit, Paris, France.
7,992.—NURSING BOTTLE.—V. H. Smith, Philadelphia, Pa.

TRADE MARKS REGISTERED.

2,150.—YEAST CAKES.—Amer. Y. Co., FondDuLac, Wis.
2,151.—CIGARS.—Freedman & Co., Detroit, Mich.
2,152.—NECKTIES.—Hellenberg *et al.*, New York city.
2,153.—OIL.—W. E. Jervey, New Orleans, La.
2,154.—TOBACCO POUCHES.—Novelty Co., New York city.
2,155.—CIGARS.—S. Lowenthal & Co., Cincinnati, Ohio.
,156.—PLAYING CARDS.—V. E. Mauger, New York city
2,157.—FELON CURE.—W. H. Puffer, Athol, Mass.
2,158.—SHIRTS.—Burlock Man. Co., Bridgeport, Conn.

SCHEDULE OF PATENT FEES.

On each Caveat	$10
On each Trade mark	$25
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On issuing each original Patent	$20
On appeal to Examiners-in-Chief	$10
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On application for Design (7 years)	$15
On application for Design (14 years)	$30

CANADIAN PATENTS.

LIST OF PATENTS GRANTED IN CANADA,

JANUARY 7 to JANUARY 8, 1874.

4,217.—H. J. Wattles, Toronto City, Ont. Improvements on a machine for washing vegetables, called "Wattles' Vegetable Washer." Jan. 7, 1875.

4,218.—J. R. Smith, Brockville, Leeds and Grenville counties, Ont. Improvements on clothes wringers, called "The Victor Clothes Wringer." Jan. 7, 1875.

4,219.—C. A. Terrey, Southwark, Surrey county, England. Improvements on setting diamonds in drills and cutting tools, called "Terrey's Diamond Cap." Jan. 7, 1875.

4,220.—J. A. Stockwell, Lynn, Essex county, Mass., U. S. Improvements on boots and shoes, called "Stockwell's Combined Toe Guard and Half Sole for Boots and Shoes." Jan. 7, 1875.

4,221.—J. C. and C. J. Sturgeon, Erie, Erie county, Pa., U. S. Improvements in lawn mowers and harvesters, called "Sturgeon's Improved Lawn Mower and Harvester." Jan. 7, 1875.

4,222.—J. Lennerton, Princeport, Colchester county, Nova Scotia. Machine for making tree nail wedges, called Lennerton's Tree Nail Wedge Machine." Jan. 7, 1875.

4,223.—J. W. Elliott, Toronto City, Ont. Machine for the external application of croton oil, etc., called "Elliott's Counter-Irritant." Jan. 7, 1875.

4,224.—J. Vessot and S. Vessot, Jr., Joliette, Joliette county, P. Q. Améliorations an sémoir et herse combinés, dits "Le sémoir, herse, et rouleau combinés de J. & S. Vessot." Jan. 5, 1875. Improvement in combined harrow and sowing machine.

4,225.—R. B. Anderson and M. Anderson, Sackville, New Brunswick, Canada. Improvement on gentleman's scarf, called "Anderson's Improved Scarf or Necktie Holder." Jan. 7, 1875.

4,226.—G. W. McNeil, Akron, Summit county, Ohio, U. S. Improvements on wheat scourers, called "McNeil's Wheat Scourer." Jan. 7, 1875.

4,227.—R. Cobleigh, Chester, Windsor county, Vt., U. S. Improvements in carriages for children, called "Cobleigh's Improved Children's Carriage." Jan. 7, 1875.

4,228.—J. Telfer, Toronto City, Ont. Improvements on lamp-holding attachment to sewing machines, called "Telfer's Lamp Holding Attachment to Sewing Machines." Jan. 7, 1875.

4,229.—E. Mercier, Springfield, Hampden county, Mass., M. Lanctot, Jersey City, Hudson county, N. J., D. H. Elliott, New York city, U. S. Improvement on railway switch, called "Mercier's Railway Switch." Jan. 7, 1875.

4,230.—Wm. S. Wooton, J. G. Blake, and H. H. Fulton all of Indianapolis, Marion county, Ind., U. S. Improvements on secretaries, called "Wooton's Secretary." Jan. 7, 1875.

4,231.—R. M. Wanzer, Hamilton county, assignee of J. Jamison, same place. Improvements in sewing machines, called "The Wanzer B." Jan. 7, 1870.

4,232.—Wm. Cochrane, La Fayette, Tippecanoe county, Ind., U. S. Improvements on harvesting machines, called "Cochrane's Harvester." Jan. 7, 1875.

4,233.—S. Paling, Woodstock, Oxford county, Ont. 1st extension, No. 598, on "The Ontario Balanced Window Blind." Jan. 7, 1875.

4,234.—S. Paling, Woodstock, Oxford county, Ont. 2d extension, No. 598, on "The Ontario Balanced Window Blind." Jan. 9, 1875.

4,235.—H. A. Dierkes, New York city, N. Y., U. S. Improvements in hanging and operating bells, called "Dierke's Improvements in Hanging and Operating Bells." Jan. 8, 1875.

4,236.—J. M. and C. T. Schramm, Pontoosuc, Hancock county, Ill., U. S. Improvements in the shingling of roofs, called "Schramm & Sons' Improvement in the Shingling of Roofs." Jan. 8, 1875.

4,237.—J. L. Massie, Cowansville, Missisquoi county, P.Q. Improvements in heaters, called "Massie's Improved Heater." Jan. 8, 1875.

4,238.—C. H. Miller, Buffalo, Erie county, N. Y., U. S. Improvements in wooden pavements, called "Miller's Improved Wooden Pavement." Jan. 8, 1875.

4,239.—J. C. Codyé, Windsor, Essex county, Mass., U. S. Improvements in water filters, called "Codyé's Excelsior Water Filter." Jan. 8. 1875.

4,240.—L. A. Powers, Meriden, New Haven county, Conn., U. S. Improvements on rakes, called "Powers' Rake." Jan. 8, 1875.

4,241.—W. S. Von Essen, Hamburgh, Germany. Improvements on apparatus for cleaning boiler tubes by steam, called "W. Von Essen's Steam Boiler Tube Cleaner." Jan. 8, 1875.

4 242.—W. A. Martin, London, England. Improvements on furnaces and furnace doors, called "Martin's Improvements on Furnace and Furnace Doors." Jan. 8 1875.

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And How to Obtain Them.

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Construct a neat model, not over a foot in any dimension—smaller if possible—and send by express, prepaid, addressed to MUNN & CO., 37 Park Row, together with a description of its operation and merits. On receipt thereof, they will examine the invention carefully, and advise you as to its patentability, free of charge. Or, if you have not time, or the means at hand, to construct a model, make as good a pen and ink sketch of the improvement as possible and send by mail. An answer as to the prospect of a patent will be received, usually, by return of mail. It is sometimes best to have a search made at the Patent Office; such a measure often saves the cost of an application for a patent.

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